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R. Luria and F. Ia. Yudovich

An experimental investigation by A. R. Luria and F. Ia. Yudovich, edited by Joan Simon, and with a new introduction by James Britton

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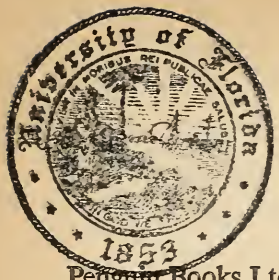

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ntroduction

From many diverse sources has come the idea, the hypothesis, hat the importance of language to mankind lies not so much in he fact that it is the means by which we cooperate and communiate with each other as in the fact that it enables each of us, as ndividuals and in cooperation, to represent the world to ourelves as we encounter it: and so to construct – moment by noment and year after year – a cumulative representation of 'the vorld as I have known it'. In infancy the representation is made n talk; as for example this four year old who represents to herelf, at the moment of encounter, the objects and events that ngage her as she plays with her toy farm – to which had recently een added some model zoo animals:

'm going to have a zoo field . . . now we've got more animals . . . three nore, so I think we'll have a zoo field. (*Whispering*) Well, now, let's ee . . . let's see how it *feels*. . . . Get this pin now – there, you see. Haven't got a cage . . . should be a zoo man as well. . . . Look, must et this zoo man, then we'll be all right. Really a farm man, but he can e a zoo man. . . . Depends what their job is, doesn't it, Dad? (*She goes ff and fetches him.*) There now, you see. . . . What do you want. . . . Vell, if you could look after these two elephants . . . I'll go and see bout this . . . this panda. Well, all right. He squeezed out, and he got n. Shut the gate again. . . . He said Hello. . . . He said Hello. Dad, what want to know is if the bear sitting up and the mother can fit in the ouse. . . . Spect she can though. . . .

. The bear . . . Dad, I'm going to call the fellow Brumas, the polar bear :llow. Look, the man and the lady are talking. The man's looking after ne elephant and the lady's looking after the polar bear. They're talking ver the wall. . . . You didn't see any polar bears, did you?

When a person's standing it's taller than when it's sitting . . . when an nimal's sitting it's taller than when it's standing. Spect it's because ney've four legs. It's because of the legs . . . your legs go up on the round, don't they? But really an animal's front paws is really its

hands, isn't it? When he sits up (*i.e. the polar bear*) he's as tall as th lady....

Her chatter constitutes a verbal representation of the things sh sees and the things that happen – in this case mainly the event she causes to happen. Some of the more general formulation may be important elements in her cumulative representation o the world (as for example her conception of 'home' in the fina comment quoted): all may be seen as facilitations at some level o subsequent encounters. On one occasion over a year earlier, whe she turned reluctantly from her engrossment with that same to farm, she said: 'Oh why am I *real* so I can't live in my littl farm?' – a representation that surely would persist and evolv through the years.

We continue of course to use talk as a means of representin the world: and that would serve to describe a great deal of th chat and the gossip that most of us devote our time to so gener ously. But we use writing also, and we use thought – going over i our minds events of the day, for example – and those two pro cesses would not normally be possible to us unless we had buil their foundations in speech.

I have arrived at this point, as many others have done, from desire to understand the nature of language and how it works fo us. What I have now to go on to – or back to – is a realizatio that language is only one of a number of means by which w represent the world to ourselves; furthermore, that what make us unique among the animals is not our ability to speak *per se* but our habit of representing experience to ourselves by on means or another. We do so in terms of our own movements, i terms of our perceptions, and probably, more fundamentally still in terms of our feelings and value-judgements, though this remain a speculation and a mystery; and we do so in language.

We have no difficulty in recognizing the distinction between th process of looking at a face and the process of calling that face t mind, nor in realizing that the two are in some way related. Ou ability to call the face to mind is what allows me to talk about *representation* of the world in terms of perception; the effects o my looking have not been utterly lost when I close my eyes or g

away; what I have perceived I have 'represented to myself', and I may go back to the representation long after the face has disappeared from the range of my looking.

Being a man of parts, I can play 'God Save the Queen' on any ordinary piano on request (though three parts of me still wants to call it 'God Save the King'). If, however, you asked me to play the chords that accompany, say 'send her victorious', I should not be able to do so without actually playing, or rehearsing in mind and muscles, the phrases of the tune that lead up to it. I *have* the representation – the fact that I succeed in doing as you ask me would prove that; but it is a representation largely in terms of my movements (in relation to my perception of the piano-keys) and only minimally in terms of the appearance of the notation on the page. Hence I need to go through the repertoire of movements in order to recapture it.

Piaget and Bruner have shown that young children represent the world to themselves first in terms of perception-cum-movement – and I put it that way to indicate that the two are inseparable; and later also in terms of visual imagery, or in perception freed from movement; and that the *simultaneity* of visual representation compared with the *serial* nature of perception-cum-movement results in a better organized system of representing, a more effective filing system for experience.

These two modes of representation are well established before the third, the linguistic mode, comes into operation. When, at about two years of age, a child begins to speak, so achieving this third system, his talk is used as a means of assisting the modes of representation previously acquired; that is to say, the modes of movement and of perception. In fact his language is at first tied to the 'here and now', limited (with a few notable exceptions) to speech about what may be seen and handled in the immediate situation. It is speech-cum-action, or as Luria calls it, 'synpraxic speech' (see page 50). Its function as such is to facilitate activity in the here and now, activity in terms of movement and perception. Parts of the monologue of the four year old quoted above will serve to illustrate this earlier stage. ('Well, if you could look

after these two elephants ... I'll go and see about this ... this panda. Well, all right. He squeezed out, and he got in. Shut the gate again ...' etc.) As we read it with imaginative insight I believe we can sense the fact that her speech operates as a way of assisting her moves in the game.

But at one particular point in that monologue we find language operating differently. She talks of things she *wants*, things that are *not* there in front of her – first 'the cage', and then 'the zoo man'; and having spoken of him, off she goes to get him.

This indicates what really amounts to a fourth kind of representation. Just as movement-cum-perception provided the basis from which the second stage was reached, that of perception freed from movement, so language tied to the here-and-now forms the basis from which there develops linguistic representation freed from these bonds, freed from its dependence upon movement and perception. At this fourth stage words come to be used not *with* objects but *in place of them*. As our example directly suggests, the ability to use words in this way further assists exploratory activity by breaking out of the immediate situation. Things previously experienced may be imported into the situation, as the zoo man is: ideas derived from past experience may be brought to bear upon present problems. The result is a wide extension of a child's activities, the enrichment of the possibilities of the here-and-now by drawing upon the resources of the 'not-here' and the 'not-now'.

We are not concerned here simply with what the use of language may import into a situation: we are concerned also with *the way language does so*. Luria has demonstrated in a number of experiments (carried out both before and after the original publication of this book) that what is formulated in language carries a special power to influence a young child's behaviour; that from obeying the verbal instructions of an adult he goes on to instruct himself in words, both directly and indirectly; and that for him *to say what he plans to do* increases his ability to persist and complete an undertaking: that language, in short, performs a *regulative function*.

It has long seemed to me that the great importance of Luria's vork in this book lies in its indication of the close relation be- ween language ability and the scope and complexity of human ehaviour in general. Of the two outcomes his experiment will eport – the effect of encouraging normal speech performance in oth the twins, and the further effect of speech training upon one f them – it is the former, the changes of behaviour in both boys fter their speech had become 'normal', that is without doubt he major effect. By the same token, Luria's hypothesis that lang- iage acquires a regulative function, a power of coordinating, tabilizing and facilitating other forms of behaviour – and the vidence and explanations with which he supports it – form one f the most important contributions he makes in this book to a eneral reader's understanding of the way language works. His hapter 6 is for this reason a key chapter, and his formulation on age 84 has acquired, in my copy, a kind of illuminated border ore often associated with 'texts' of another kind:

> With the appearance of speech disconnected from action ... it was to e expected that there should also arise the *possibility of formulating a ystem of connections transcending the boundaries of the immediate ituation* and *of subordinating action to these verbally formulated connec- ions.*

hat, taken at its very simplest level, is how the zoo man got to he four year old's model zoo field.

That same four year old had a sister two years younger than erself. One Saturday morning, when they were respectively four nd a half and two and a half, I tried, for about fifteen minutes, o keep a record of all that happened and everything they said. uring the course of it the older child, Clare, sat on the sofa with oloured pencils and a drawing block and, in spite of interrup- ions from Alison, the younger child, she completed two pictures; ne of a girl riding a pony and one of a girl diving into a pool – oth of them references back to things she had seen and done on er summer holiday three months earlier. She talked to herself om time to time about what she was doing ('Want to make your ail a bit shorter – that's what you're wanting.') – but sometimes audibly.

Meanwhile, Alison

1. Pretended she was a goat and tried to butt Clare.
2. Tried to climb on to the sofa.
3. Came over to me and claimed my pen.
4. Saw a ruler on the table, asked what it was, wanted it.
5. Crawled under the table.
6. Came out and asked me what I was doing.
7. Climbed on to a chair by the window, looked out and mad 'fizzing' noises.
8. Climbed down, saw her shoe on the floor and began to tak the lace out.
9. Came over and asked me to put the shoe on her foot.
10. Saw the other shoe, and did the same with that.
11. Went over to Clare and pretended to be a goat again.
12. Climbed on to the sofa and claimed the pencil Clare wa using.

It will be clear I think that Alison's behaviour arises almos entirely in response to the various stimuli of the here and now and is in this respect in direct contrast to Clare's sustained activ ity. A principal conclusion from Luria's experiment would b that language is the primary means by which the behaviou typical of the four and a half year old is derived from that typica of the two and a half year old – a gain which might crudely b called one of 'undistractability'. The story Luria will tell of th twins in his experiment may in fact be seen as an accelerate journey between the stages represented respectively by Aliso and Clare. For those of us who from observation and experienc know more about children than we do about psychology, tha starting-point may prove a helpful approach to what Luria has t say.

As a child acquires the ability to use language to refer to thing not present, it becomes possible for him to represent in word 'what might be' rather than simply 'what is'. As he does so hi formulation may equally be a *fiction* – a make-believe – or a *plan* and sometimes the two will be indistinguishable. A two-year-ol child is able to make the first moves in this direction: but th

ability either to sustain the make-believe or to carry out the planned activity is one that is developed as the facility in verbalizing grows.

The habit of verbalizing originates in and is fostered above all by speech with an adult: the appropriateness of the adult's early 'instructions' to the child's own concerns, and the eagerness and confidence with which he 'obeys' them, constitute the criteria of favourable conditions. As Luria reminds us (in Vigotsky's words) 'a function which is earlier divided between two people becomes later the means of organization of the child's own behaviour' (page 26).

All that – and I must leave it at that – is the background against which I see Professor Luria's experiment in this book. What I must not do is suggest that it is the background against which the author himself sees it; this he has set out rigorously and fully in his first chapter. (But it is a difficult statement for readers not acquainted with the kind of psychological theories he discusses: I recommend for such readers that they begin reading at chapter 2, taking on trust that first paragraph on page 34, and returning to read chapter 1 when they have read the rest of the book.)

I have discussed *Speech and the Development of Mental Processes in the Child* with a great many teachers and students since the time the English translation was first published in 1959. It has rarely failed, in my experience, to make a strong impact; and its importance has seemed to grow rather than decline as the field in which it operates has become more familiar. It is impossible, moreover, to read the book without finding, between the lines, the human concern and sympathies of its authors: hence, among many other reasons, the honour I feel in being allowed to introduce it to a further generation of readers of the English language.

James Britton 1971

ditorial Note

his book was first published by the Academy of Educational ciences of the RSFSR in 1956. It has been translated by Mr . Kovasc and Mrs J. Simon but, because of the obvious diffi- ılties of translating research concerned with primitive and efective speech, the text has been checked by the author who has lso made minor amendments and additions for this edition.

It should be noted that Russian is an inflected language which esembles Latin and German from the point of view of mor- hology. The transliterated examples of both children's speech ıow that phonetical impairment persisted to a considerable xtent even at the close of the experiment; elsewhere this must be ssumed as it cannot be adequately reproduced in translation.

The system of transliteration adopted is that used by the ritish Museum; except that, in order to retain forms now widely ccepted, 'y' is used to render the Russian vowel 'bl' (according) the American Library of Congress system) and also used ıstead of 'i' at the end of proper names. Occasionally softened ronunciation is indicated additionally (e.g. by 'ie' instead of 'e')) bring out mispronunciation more clearly. Finally, though revious translations have rendered the Russian terms 'psikhika' nd 'psikhicheskii' as 'psyche' and 'psychic', here 'mind' and nental' are used in accordance with the author's advice.

It must be remembered that the pre-school child in the USSR under seven, the age at which ordinary schooling begins.

Professor Luria heads a group of psychologists at the Institute f Defectology of the Academy of Educational Sciences and is lso on the staff of the Department of Psychology, Moscow Uni- ersity. An account of the background of his work, and transla- ons of some of the papers mentioned in this volume, may be ound in *Psychology in the Soviet Union*, edited by Brian Simon.

ɔan Simon October 1958

Preface to the English Edition

I am very grateful to Mrs Joan Simon for her initiative in arran ing the translation of this little book. This enables me to sha with English readers observations which were undertaken in cc laboration with F. Ia Yudovich many years ago but have on recently been prepared for the press and published.

If an author has the right to express feelings about his ow work, I must note the warm sense with which I always turn to th material published in this small book.

The role played by speech in that formation of the child mental processes is one of the most important psychological que tions, but, as is well known, it is very difficult to analyse. Becau speech develops in the course of the child's general maturati and development it has seemed almost impossible to assess th specific influence exercised by the child's speech on the develo ment of his mental processes. We must, therefore, particular value those rare occasions when special conditions enable us single out the speech factor and, with the aid of an education experiment, to study its isolated influence.

The investigation of a pair of identical twins with retard speech and backward behaviour, and of the changes in spee and behaviour brought about by an educational experiment – of which are described in this book – furnishes material of mu interest to psychology, and I am very glad to be able to share t results of this investigation with English readers.

I have long since lost sight of the two twins, Liosha and Yu but I have preserved over many years the clearest impressions the work undertaken with them.

A. R. Luria Moscow, February 1958

reface to the Penguin Edition

am very glad to learn that my book will appear in the Penguin apers in Education series.

It is clear that the problems of speech development in children re of the highest importance both for psychology, linguistics nd education. A pair of identical twins with retarded speech, who ere permanently in each other's company, gave me a wonderful pportunity to study closely the mechanics of speech develop- ient and particularly the transition from primitive 'synpraxic' peech to a fully developed form of speech which uses 'syntactic' nguage. The twins were separated, thus creating the necessity or them to develop conventional language forms and providing ie with the opportunity of observing the development of new nd higher forms of speech and the more sophisticated forms of ehaviour which are closely dependent on language skills.

I can only hope English readers will appreciate the fascination f this process, what new, exciting perspectives in behaviour are voked by the mastering of language, and how important for a sychologist or a teacher it is to find new ways of analysing it.

. R. Luria Moscow, August 1971

hapter 1
he Role of Speech in the ormation of Mental Processes: n Outline of the Problem

ıe role played by speech in the formation of the child's mental ocesses was not, for a long period, regarded as an important pect of psychology.

In studying the development of mental processes, and in the tempt to explain the appearance of complex forms of mental tivity (voluntary attention, active memorization or active haviour), psychologists did not consider the genesis of these pro-sses in connection with the child's basic forms of communica-on with the surrounding world. Failing to find the real roots of ıese complex forms of mental activity, they either retreated from ientific analysis or else wrote idealistic tracts about their origin. ypical of the retreat from study of the full complexity of the rmation of higher mental processes is the work of a number of haviourists, beginning with that of Thorndike and Watson and ıding with the latest investigations of Guthrie, who consider ıat all the complex forms of the child's activity can be reduced to combination of habits, and regard speech itself as an aspect of otor habits which does not have any special place in the child's haviour.

Typical of the idealistic approach to the origin of complex ental processes is the work of such authors as K. Bühler and h. Bühler, who regard the development of the child's higher rvous activity as the gradual unfolding of inborn spiritual ualities, as a simple manifestation of a continuously growing iritual activity which appears minimally in the early stages of ıe child's development and, in the process of maturation, grad-ally begins to take a more and more leading part.

What are the weaknesses of these two standpoints?

To reduce a complex form of the child's mental activity to a mbination of elementary motor habits implies a mechanistic proach which ignores what is most essential in man's mental fe; which leaves unanswered the question – what special mech-

anisms differentiate such aspects of activity as voluntary memoriz tion, active attention or volitional activity – though a profour analysis of these mechanisms is one of the basic tasks of educ tional science.

To regard the development of these forms of mental activity the simple resultant of maturation of inborn mental properties abilities is to take up a position already rejected by science; it to rely, when treating concrete aspects of the formation of a organism's structure and activity, on the influence of some kir of further, unanalysable 'inner force' which is not subject to ar kind of formation but only appears, is manifested, in the proce of development.

These standpoints are defective not only in theory but also practice. They imply a departure from scientific investigation *how* complex forms of activity are gradually constructed in tl process of the child's development and his active, living cor munication with the environment, by regarding them as tl mechanical product of training or as the simple maturing primary 'spiritual qualities'. These conceptions disarm educ tional science which is fundamentally concerned with the form tive influencing of the child's mental development.

The first of these theories, regarding complex development a combination of simple habits, reduces teaching and educatio to simple training; the second, regarding 'the maturation mental abilities' as a spontaneously continuous process, not on shrugs off the problem of explaining the mechanisms of ment development but also relegates educational influences to a ve subsidiary place, understanding them at most as a means speeding up, or slowing down, 'natural maturation', the directi of which is predetermined. In practice, as in theory, this idealis approach to the development of complex mental processes man has long since become an obstacle to a scientific unde standing of the mind.[1]

Soviet psychology has completely rejected these oversimplifi and unscientific conceptions. The theoretical prerequisites of

cientific approach to the development of complex mental ctivity, the conceptions which inform Soviet psychology, can be xpressed in three fundamental propositions.

Materialist psychology rejects as useless the approach to any orm of mental activity – and, in particular, the more complex orms – as the product of unanalysable 'abilities' which are in- ate in the organization of the brain. Proceeding from the reflex heory advanced by Sechenov and elaborated by Pavlov, it egards all mental processes as complex functional formations hich are built up as an outcome of concrete forms of interaction etween the organism and its environment. In the process of oncrete activity, through reflex responses to the environment, ynamic systems or 'systems of functions' are formed which we ave no foundation to regard as innate properties of mental life; hich can only be understood as the outcome of certain forms of eflex activity subject at every point to concrete analysis.[2]

This first proposition of materialist psychology, which has a rm philosophical basis in Lenin's theory of reflection, makes ossible a new kind of approach to all the complex forms of ental life; one which, rejecting all attempts to seek their roots n the 'depths of the soul', turns to real forms of interrelation etween organism and environment. This point of departure, hich entirely reverses views that have prevailed for centuries, learly has a decisive significance for the science of psychology.

The second proposition of Soviet psychology, also basic to aterialist science, is the introduction of the role of development nto study of the formation of mental processes.

Sechenov considered that a scientific psychology must be con- erned with the 'formation of mental activity'. From this posi- on he decisively overturned metaphysical conceptions which haracterize mental phenomena as the product of eternally xisting properties, and emphasized that an approach to these henomena from the standpoint of development was the essential ondition for an embodiment of the reflex theory.

Only a clear understanding that, at each particular stage of evelopment, concrete forms of activity present the organism

with new problems, new demands, which necessitate the develop ment of new forms of reflex action, only such a conception can ensure the development of scientific research into the basic laws governing the formation of complex aspects of human mental activity.

This is the direction taken by Soviet psychological research.

The third proposition of Soviet psychology is study of the child's mental activity as the outcome of his life in certain determined social circumstances. Human mental activity takes place in conditions of actual communication with the environment, in the course of which the child acquires from adults the experience of many generations. The transition from the animal world to the stage of man signifies the introduction of a new principle of development. At the animal stage the development of higher nervous processes in each species is the outcome of individual experience but with the transition to man the basic form of mental development becomes acquisition of the experiences of other people through joint practice and speech.

Language, which incorporates the experience of generations or, more broadly speaking, of mankind, is included in the process of the child's development from the first months of his life. By naming objects, and so defining their connections and relations the adult creates new forms of reflection of reality in the child, in comparably deeper and more complex than those which he could have formed through individual experience. This whole process of the transmission of knowledge and the formation of concepts which is the basic way the adult influences the child, constitutes the central process of the child's intellectual development. If this formation of the child's mental activity in the process of education is left out of consideration, it is impossible either to understand or to explain causally any of the facts of child psychology.

Study of the child's mental processes as the product of his intercommunication with the environment, as the acquisition of common experiences transmitted by speech, has, therefore become the most important principle of Soviet psychology which informs all research.

ince this principle has such decisive significance, and since it is entral to our investigation, it is necessary to examine this uestion more fully.

It would be mistaken to suppose that verbal intercourse with dults merely changes the content of the child's conscious activity ithout changing its form.

Intercommunication with adults is of decisive significance ecause the acquisition of a language system involves a reganization of all the child's basic mental processes; the word ius becomes a tremendous factor which forms mental activity, erfecting the reflection of reality and creating new forms of ttention, of memory and imagination, of thought and action.

With the acquisition of such an 'extraordinary supplement' as ie word, the most important factor emerging at the stage of man, iere is introduced, in the words of Pavlov, 'a new principle of ervous activity ... the abstraction and with this the generalizaon of the innumerable signals of the preceding system, and, gain ... analysis and synthesis of these new generalized signals; n this depends man's infinite capacity for orientation in the nvironment, and, too, his highest form of adaptation – science'.[3]

The word has a basic function not only because it indicates a rresponding object in the external world, but also because it ostracts, isolates, the necessary signal, generalizes perceived gnals and relates them to certain categories; it is this systematizion of direct experience that makes the role of the word in the rmation of mental processes so exceptionally important.

The mother's very first words, when she shows her child difrent objects and names them with a certain word, have an inscernible but decisively important influence on the formation of s mental processes. The word, connected with direct perception the object, isolates its essential features; to name the perceived ject 'a glass', adding its functional role 'for drinking', isolates e essential and inhibits the less essential properties of the object uch as its weight or external shape); to indicate with the word lass' any glass, regardless of its shape, makes perception of this ject permanent and generalized.

The word, handing on the experience of generations as this

experience is incorporated in language, locks a complex system c connections in the child's cortex and becomes a tremendous too introducing forms of analysis and synthesis into the child's pe ception which he would be unable to develop by himself. Fc instance, when he acquires the word 'inkstand' (chernilnitsa) th child necessarily acquires also a form of systematization of pe ceived phenomena. He relates 'inkstand' to the groups of thing related to colours (chern-, black), tools (-il-, the suffix for mos Russian words designating tools) and containers (-nits-, the su fix for words designating these). As the word influences the chil therefore, it deepens and immeasurably enriches his direct pe ception, forms his consciousness.

This reorganization of perception – this transference of huma consciousness from the stage of direct sensory experience to th stage of generalized, rational understanding – by no mean exhausts the influence of the word in the formation of menta processes.

When he acquires a word, which isolates a particular thing an serves as a signal to a particular action, the child, as he carries ou an adult's verbal instruction, is subordinated to this word. Th adult's word becomes a regulator of his behaviour and th organization of the child's activity is thereby lifted to a highe qualitatively new, stage. This subordination of his reactions t the word of an adult is the beginning of a long chain of formatio of complex aspects of his conscious and voluntary activity.

By subordinating himself to the adult's verbal orders the chil acquires a system of these verbal instructions and graduall begins to utilize them for the regulation of his own behaviou Repeating the verbal indication of an object, he places it among other directly perceived things and makes it the object of his ow complex active attention. When he establishes verbally the com plex connections and relations between perceived phenomena h introduces essential changes in the perception of things influe cing him; he begins to act according to verbally elaborate influences by reproducing the verbal connections reinforced b earlier adult instructions, and thereafter modifies them, isolatin verbally the immediate and final aims of his behaviour, indicatin

he means of achieving these aims and subordinating these aims to erbally formulated instructions. By these means the child advances to the stage of a new form of regulating his behaviour which gradually becomes, in Pavlov's words, 'a system, a unitary, higher form of self-regulation'. In sum, speech, the basic means of communication, becomes also a means of deeper analysis and ynthesis of reality and, more fundamentally important, 'a higher regulator of behaviour'.

All this has a decisive significance for materialist psychology. The fact that the word is included in the content of nearly all basic forms of human activity, that it participates in the formation of perception and memory, in stimulus and action, permits a new approach to an important region of mental activity. Perception and attention, memory and imagination, consciousness and action, cease to be regarded as simple, eternal, innate mental properties'. They begin to be understood as the product of complex social forms of the child's mental processes; as complex systems of functions' which appear as a result of the development of the child's activity in the process of intercourse; as complex reflective acts in the content of which speech is included, which, using Pavlov's terminology, are realized with the close participation of the two signal systems – the first signal system being concerned with directly perceived stimuli, the second with systems of verbal elaboration.

Only by understanding that the sources of all complex mental processes do not lie in the depths of the soul, but are to be found in complex forms of human social life and in the child's communication with people surrounding him, can we finally outgrow the prejudices which have been rooted for centuries in psychological science.

Soviet psychologists began to study the child's mental development in close connection with the development of speech three decades ago and there are a number of works dealing with this question.

L. S. Vigotsky was one of the first to express the view that speech plays a decisive role in the formation of mental processes,

and that the basic method of analysing the development of higher psychological functions is investigation of that reorganization of mental processes which takes place under the influence of speech.

He investigated the development of understanding in children and reached the conclusion that characteristic forms of communication begin when there is generalization of several objects as a whole from direct impressions, and end when each process of analysis and synthesis of reality is defined by a word which distinguishes the necessary features and relates the perceived object to a definite category.[4] Vigotsky and his colleagues undertook a whole series of experimental investigations: into the process of formation of active attention which begins to be built up by the directive participation of the word; into the process of development of memory which, with the mediation of the word, becomes progressively transformed into active, voluntary memorization;[5] into the development of several other higher mental processes, the analysis of which invariably showed that their complex functional organization was built up with the closest participation of speech.

All these researches convinced Vigotsky of the great significance of speech in the formation of mental processes. Besides investigating the basic stages of development of complex mental processes through the organization of speech, he also arrived at the fundamental conclusion that human mental development has its source in the verbal communication between child and adult, that 'a function which is earlier divided between two people becomes later the means of organization of the child's own behaviour'.

Vigotsky's researches were followed by numerous other studies of the part played by the word as the basis of systems of connections which allow for further formation of the child's mental processes.

Towards the close of the 1930s and the beginning of the 1940s, G. L. Rosengardt undertook an interesting series of investigations which demonstrated the role of the word in the formation of perceptions and in memorization during the first two years of life. This and other similar research[6] showed convincingly not only

hat the word is gradually excluded from other complexes perceived by the child, but also the decisively important fact that, nder its influence, the young child's perception and memory cquire new features; by allowing him to distinguish the essential eatures of an object the word makes his perception of objects eneralized and constant and creates new possibilities for the evelopment of coherent, differentiated memory.

Further research underlined the essential role played by speech n complex forms of child behaviour.[7] The development of active orms of memorization, the earliest forms of the child's volitional ehaviour and, in particular, the differentiation of motives of ehaviour and the construction of complex conscious actions – ll these have proved to be closely connected with those complex eorganizations of activity which appear in the process of generation, and to stand in close relation to the development of the hild's speech. Verbal processes, through generalization, enable he child to formulate aims and the necessary means for their chievement, to create an 'imaginative' play plan in subordination to which he can acquire complex forms of behaviour which re inaccessible to a direct attempt. Investigation of the genesis of igher forms of psychological activity once more demonstrated heir complex composition and the role of speech in forming the hild's consciousness.

Of recent years, Soviet psychologists and physiologists have ot limited themselves to these questions but have also described hanges in the course of nervous processes as a result of the participation of the second signal system.

A. G. Ivanov-Smolensky and N. I. Krasnogorsky long since tempted to show in practice the role of the word in the child's gher nervous activity.[8] Their researches showed that the word n successfully replace unconditioned reinforcement, that with e aid of constant reinforcement of a conditioned signal through rbal instruction it is possible to form a new temporary connecon, as successfully as by use of an unconditioned (food or fensive) reinforcement. Experiments undertaken by Ivanov-molensky's students also showed that the word can successfully place a direct conditioned signal, that the reaction earlier

obtained to the picture of a sparrow can easily and at once b obtained by substituting the word 'sparrow', the related wor 'swallow', or the generalizing word 'bird'. Several other psycho logists obtained similar data.[9]

This work proved that the word can replace unconditioned c conditioned stimuli. Further research has underlined the essenti fact that the word exercises a significant influence on the cours of elaboration of temporary connections, hastening the process c elaboration, rendering the connections more stable and con tributing substantially new features to their formation.

When elaborating differentiation in children of one and a ha to two years, A. A. Lublinskaya noted that difficulties in diffe entiating strongly decreased when verbal labels were added to th differentiating signals. Children undergoing the experiment wer able to differentiate four to five times more quickly than childre in the control group and the differentiations elaborated with th participation of the word were more stable and generalized tha those elaborated without it.[10]

Special research has also shown that the experimenter instructions not only significantly hasten the process of elabora tion of new temporary connections and make them more stabl but also essentially reorganize the natural course of these pro cesses, for instance, by changing the natural relation of th strength of stimuli. It is well known that with the usual comple stimuli the leading role is played by the strong component, whil the weak component of the complex retreats into the backgroun and is inhibited by the strong one.[11] But the word of the exper menter (or systems of previous connections evoked by the word reinforce the weak component of the complex so that it change into the strong, leading one, while the physically stronger com ponent loses its leading significance.[12]

It is interesting to note that in the usual experimental cond tions the word had this effect with four- to five-year-old children whereas in cases where the word of the experimenter revive stable old connections a change in the strength relations c stimuli occurs much earlier. Even more interesting is the fact tha the child's speech itself begins to be progressively included in th

ɔrmation of temporary connections and essentially changes this rocess.

Already in 1929 Vigotsky showed that every time the little hild of four to five years of age is confronted with a problem hich causes some kind of difficulty, there arises external speech, ot directed to his interlocutor; the child states the situation that as arisen, takes from it 'verbal copy' and then reproduces those ɔnnections of his past experience which may help him out of resent difficulties. Vigotsky attempted to show that this was not ffective 'egocentric speech', about which Piaget was then riting, but the inclusion of speech to mediate behaviour by the ɔbilization of verbal connections which help to solve a difficult roblem. His observations showed that the child first speaks loud, to himself, but that his speech gradually dies away, passes ɔto a whisper and finally becomes internal speech; and that the hild of seven to eight years begins to solve complex problems ith the aid of systems of internal verbal connections, which have risen earlier in the course of verbal intercourse but have since ecome converted into his own individual mechanisms, enabling im to include verbal connections in the organization of his tivity.[13]

A period of twenty years elapsed before the data obtained by igotsky were checked and proved by new research. N. P. Para-ɔnova, analysing the process of formation of motor reactions in ɛ normal pre-school child, showed that the inclusion of his own ɔeech as a means of organizing his activity itself represents a ɔmplex and developing process. In the case of the child of three ɛars, the elaboration of temporary connections by the method of ɛrbal reinforcement is not yet mediated by his own speech, hich gradually dies away, and proceeds slowly; but with the ild of four to five years the process substantially changes. The ɔpearance of the signal, accompanied by reinforcement, first lls forth questions from the child ('Do I have to press on this ɛ?') and afterwards produces positive repetitions ('This red ɛ! I have to press this!'); this shows that the connections aborated have achieved their generalized verbal formulation.[14]

These verbal repetitions are preserved for some time, but in the

six- to seven-year-old child they die away and vanish. What characteristic here is the fact that, with the appearance of verb formulations – in other words with inclusion of the child's ow speech in his orientation to the signals presented – the very pr cess of elaboration of new connections changes. Connectio which were previously elaborated gradually, which needed perm nent reinforcement and were extinguished when it was remove begin now to be elaborated quickly, sometimes 'on the spot become stably reinforced, cease to be in need of permanent rei forcement and begin to show those features of 'self-regulatio which Pavlov regarded as the essential peculiarity of huma higher nervous activity.

The direct participation of the child's own speech in the proce of elaboration of new connections is, according to these findings, well established in the child of five to six years. However, oth research has shown that this participation of speech in the elab ration of new connections can be essentially disturbed by injuri to the brain and also by abnormal development; above all b that form of mental retardation which results from acute organ disease of the brain in early childhood.[16]

In such cases the processes of higher nervous activity are s imperfect and the very speech of the child so defective – so poo are his connections, so immobile his dynamics – that the partic pation of speech in the formation of new connections becom impossible and these are elaborated without the requisite part cipation of the abstracting and generalizing function of the wor It is precisely because of this that the mentally retarded schoo child does not show those features of swift, mobile and stab elaboration of new connections which, as has just been pointe out, are characteristic features of the realization of this proce when there is full-value participation of the two signal system The process of elaborating new connections becomes slow an gradual, continues for a long time to depend on permanent rei forcement, remains stable only because of the strictly determine discipline of the experiment, is easily inhibited by complicatio of the conditions and is not reflected in any kind of coherer verbal formulation.

Observations of mentally retarded children permit us to proach the problem of the role of speech in the formation of nporary connections from another angle; to study how the ld's behaviour differs when the abstraction and generalization speech plays no part in its formation.[17]

Investigations of mentally retarded children belong to a new ion of study where different methods are used to throw light the role of speech in the formation of complex aspects of ntal activity; this research is concerned with the data of chopathology.

About thirty years ago the German psychopathologist K. ldstein and his colleague, the psychologist A. Gelb, expressed view that the acquisition of speech allowed man to rise above ect, visual perception to analysis of its data, to the relation of ceived objects to certain categories, so enabling him to ganize his behaviour, not according to the visually perceived uation, but according to a deeper 'categorized' reflection of the rld. They therefore connected freer, 'categorized' behaviour h acquisition of the word; very similar views were advanced the well-known English neurologist, H. Head.

After prolonged research they advanced the hypothesis that complicated structure of 'abstract' or 'categorized' be- viour, which is a characteristic human feature, falls to pieces in es of special verbal disorder – aphasia – which arise as a result disturbances in the normal functioning of the cortex. They nected this disturbance of speech with the patient's return to re primitive and concrete behaviour. In the case of such ients, the possibility of advancing from the direct perceptional d is excluded and what should be an abstract 'categorized' eration becomes a simple reproduction of visual situations well ablished in the patient's previous experience.[18]

This material provides a valuable illustration of the role of the rd in the organization of complex mental processes and icates the tremendous damage to human behaviour as a result ts loss. Research into the changes in mental processes in states aphasia has contributed substantially to our understanding of dependence of complex mental processes on speech; after

these investigations it is difficult to deny that many of the higher psychological functions which have so often been discussed as manifestations of innate properties in fact result from the inclusion in activity of that tremendous formative factor, the word.

The data of psychopathological research, accumulated by Gelb, Goldstein, Head and other neurologists abroad, find a clear explanation in the psychology of higher nervous activity; in particular in Pavlov's finding concerning the interaction of the two signal systems and their participation in the formation of every human activity. Closely related data, which permit of an approach to the same question from another angle, have been obtained by psychologists who have investigated the peculiarities of mental processes in deaf-mutes.

The time has long since passed when the deaf-mute child was regarded as differing from his normal counterpart only by the absence of hearing and speech. Research carried out abroad, and by Soviet psychologists, has shown the changes that take place in the deaf-mute's perceptual processes because of his undeveloped speech; excluded from speech communication because of his defect in hearing, he does not possess all those forms of reflection of reality which are realized through verbal speech. The deaf-mute who has not been taught to speak indicates objects or actions with a gesture; he is unable to abstract the quality or action from the actual object, to form abstract concepts, to systematize the phenomena of the external world with the aid of the abstract signals furnished by language but which are not natural to visual practically acquired experience. The psychological research of Vigotsky and others[19] and the educational observations of teachers of deaf-mutes show how great a degree of underdevelopment of complex perceptual processes accompanies deaf-muteness, and how much effort must be spent to restore these serious defects in complex psychological processes by continuous teaching of verbal speech.

All this rich and many-sided research contributes important material towards elucidation of the part played by speech in the

ɪrmation of the child's mental activity and lays a sound founda-
ɔn for further studies of this kind. Nevertheless, this research has
ɔme up against several practical difficulties to which we may
ɔw turn.

Chapter 2
Methods of Studying the Role of Speech in the Formation of Mental Processes

The research already described proves that speech plays a vita part in the organization of complex forms of mental activity. Bu this does not mean that detailed study of the connections betwee speech and general mental development is easy. The task o studying these interrelations in specific conditions gives rise t several substantial difficulties and we must, therefore, turn aside t discuss the methods that can best encompass this study while a the same time fully complying with the requirements of exac science.

Three methods are generally used for study of the participatio of speech in the formation of mental processes. First, there ar investigations of the child's mental development which concen trate on variations in the construction of his activity in the cours of the development of his speech. Secondly, research is concerne with cases in which injuries to the brain have led to the disintegra tion of speech; analysis of changes in the mental processes o such patients gives rise to conclusions about the role of speech i the course of normal mental development. Thirdly, a specia experimental method is used which involves either the inclusion o speech in the fulfilment of various tasks or its exclusion from thei fulfilment.

When investigating the variations that occur in the child' mental processes with the development of his speech, we canno in practice separate two closely connected factors: the variatio in the organization of mental processes which is connected wit maturation and that which depends on the changing forms of th child's life activity as a whole, the changes in his conditions o life. These two factors overlap the development of his speech s closely that it is practically impossible to separate one from th other.

It is quite natural, then, that research workers who hav utilized this method have often erroneously attributed to th

velopment of speech changes which were in fact the result of ore complex factors in the development of the child's activity as whole. Therefore, though a significant number of the investiga- ns referred to above show clearly the dependence of mental ocesses on the development of speech, they have not given a fficiently precise answer to the question – which variations in ese processes are connected with the inclusion of speech and hich are the resultant of general variations in the child's activity nnected with maturation and with changes in his conditions of e?

The second method, that of analysing variations in cases of ain injury which produce disintegration of speech, is not so ecise as it seems at first glance. Brain injuries cause deep dis- rbances in the dynamics of nervous processes which are aracteristic of the normal functioning of the brain. This is cessarily directly reflected in the dynamics of several higher rtical functions and so indirectly reflected in speech activity. is difficult to verify which variations in mental processes are e result of disturbances in the functioning of the brain as a hole and which are the specific consequence of disturbances of eech.

Many psychological investigations of aphasia have not, there- re, provided quite convincing conclusions about the dependence various aspects of mental activity on speech. Utilization of this ethod of research is further complicated by the fact that the dis- tegration of speech which results from local injuries to the brain seldom complete. Several investigations have shown that injury the brain can lead directly to disturbance of one or another of e analysers,* thus calling forth disturbances of different aspects

*The term 'analyser' was introduced by Pavlov, in place of the designa- n 'sense organ', to denote the whole analysing apparatus of the nervous tem; e.g. the acoustic (or visual etc.) analyser covers not only the peri- eral receptor with all its afferent nerves but also the nerve cells which lie the central termination of the nerve fibres, in the cortex, and must each be ated to some definite element of some definite form of energy. Pavlov also arded the motor region of the cortex as an analyser of impulses from the scles and joints. [Ed.]

of the complex act of speech but not leading every time to th same disturbances of mental processes.

The investigation of cases involving local injury to the bra does not, therefore, allow us adequately to assess the role playe by speech in the formation of normal mental activity. This metho of objective study suffers from several deficiencies and can only l accepted with essential reservations.

Even greater difficulties attend the third method, that of expe mental inclusion of speech in the accomplishment of vario tasks or experimental exclusion of speech from the process und investigation. Research workers have attempted artificially exclude the participation of speech from mental activity b various means in order to study which processes are disturbed b its exclusion.[20] But the operation of the law of elective irradiatio in the brain means that internal speech participates intimately nearly all forms of human mental activity and the attempt exclude it does not usually result in more than a partial limitatio of this participation; therefore only in exceptional cases can th method be utilized with any degree of success.[21]

The best way of avoiding these fundamental problems is investigate cases of retardation in the development of the child speech processes; in such cases an artificially hastened acquisitio of speech may lead not only to enrichment of speech activity b also to a substantial reorganization of the child's whole ment development.

An investigation of this kind eliminates the factors of gradu maturation and pathological variation in the dynamics of nervo processes which seriously complicate research. If the child speech activity can be changed in a relatively short time it b comes possible to investigate variations in mental process which arise as a direct consequence of this development speech.

Again, cases of retarded speech development are most prof able because this occurs not so much as a result of organic caus (such as innate underdevelopment of the speech apparatus) b rather because the child's situation has not evoked an urge necessity for the development of speech communication. I

anging the given situation and so creating an objective necessity r speech communication we can call forth a rapid development the child's speech and then investigate how this effects changes the structure of mental processes.

Cases of retarded speech development in twins growing up gether are obviously the most suitable for investigation. It has ng since been noted that there is a certain tendency to retarda- on of speech when twins grow up together. Since their lives are ked in the closest way, and they understand each other in the urse of joint practical activity, twins are not faced with an jective necessity for transition to speech communication so equently as other children. If to this factor is added another hich inhibits timely development of speech (for instance, re- rded development of the speech motor analyser) then sharply lineated defects in speech communication may be observed en in children of four to five years.

Such cases are, then, particularly favourable for our pur- ses. Speech retardation implies that a child who is relatively ature in his physical development does not possess a developed eech system. The peculiar way of life paired together with a other (the 'twin situation'), which does not create any pressing, jective necessity for speech communication, fixes this retarda- on. Consequently there must also be underdevelopment of all ose aspects of mental activity which depend on the acquisition full-value speech.

Cases of this kind have various advantages from the point of ew of research. The retardation in speech can be corrected rela- ely easily and quickly. If the twins are separated for some time d placed in a normal situation of communication with speaking ildren, one of the factors reinforcing the underdevelopment of eech is removed and there is created an objective necessity for eech development, as the most important means of communi- tion which is completely accessible to their age.

Comparatively little work with sound and sound-articulating alysis will be sufficient to overcome defects due to the late velopment of differentiated phonematic hearing, one of the ain factors delaying the formation of speech at an early age.

Because of the relatively rapid acquisition of speech the result ant peculiarities in the development of mental processes would b the product of the one changed factor – the acquisition of system of language and speech communication – rather than th result of gradual maturation.

Consequently an educational experiment of this kind coul contribute to the solution of that most important psychologica problem, the role of speech in the formation of mental processes

We were able to undertake such an experiment. We observe over a considerable period two twins of five years old, similar i genetic constitution (that is, uniovular twins), who as a result o retarded speech development were not possessed of developed grammatical speech. We were able to remove the factor retardin the development of speech, the 'twin situation', by separatin them for three months and placing them in parallel groups in kindergarten. Finally we were able to teach one of them, develop ing in him correct, grammatical speech.

In the course of this experiment we were able to observe tha reorganization of the child's whole mental activity which i brought about by speech, while specifically distinguishing sup plementary variations which arose as a result of the speciall planned teaching of speech.

Chapter 3
The Twins G:
Psychological Characteristics

Our subjects were two uniovular twins, Yura and Liosha G, who exhibited complex phonetical impairment and, at a comparatively late age, retarded, primitive speech – so-called 'autonomous speech.*

The twin brothers were the last children of a large family. There were five other children, ranging from nine to twenty-two years, all of whom were healthy and had developed well. We traced back late development of speech and compensatory speech defects in the mother's line; the mother and her brother only began to speak well at eight years and even now suffer from the remnants of complex phonetical impairment. Both twins were born at the normal term and, with the exception of their retarded speech, their early development was normal. Neither of them displayed any signs of mental retardation; their sole defect consisted in a very considerable retardation in their speech development.

The twins did not speak at all up to the age of two years; at the age of two and a half they had only learned to say 'mama' and 'papa'; at four years their speech consisted only in a small number of barely differentiated sounds which they used in play and communication. At this stage their mother was unable to note any stable words applied to any object or action. At the age of five the twins' speech consisted of a small number of customary words (often very distorted) and a few 'autonomous' words and sounds; the words of common speech were used mainly in communication with adults and mostly in the form of replies to questions. In communication with each other the twins' speech consisted of sounds and separate words, inextricably connected

*Under 'autonomous' speech (a designation introduced by Eliasberg and other German psychologists) we understand speech which does not possess the developed system of normal language.

with direct actions and accompanied by lively gesticulation. Their speech activity as a whole was very small and often during half an hour of play they pronounced only a few words and sounds. Usually this 'autonomous' speech was inhibited or ceased on the appearance of an adult and only when the observer was not noticed was it possible to hear during their play such sounds as: 'aga', 'ni', 'ntsa', 'en', 'a', 'bul-bul' etc. On an equal footing with these was repetition of their own names 'Liosia' (Liosha) and 'Liulia' (Yura). Sometimes general sounds were heard imitating the words of 'autonomous' speech; 'pi-pi' for chicken, 'kva' for frog etc. A small stock of normal words comprised names of domestic objects, parts of the body, a few animals and birds and elementary actions. The twins' speech was phonetically impaired, many sounds were not pronounced at all, many that should have been voiced were pronounced as softened.

The twins' understanding of other people's speech was obviously unsatisfactory. They understood usual, everyday speech when it directly referred to them but their comprehension of grammatically more complex speech which was not accompanied by explanatory actions was altogether imperfect. Speech which did not directly refer to them usually completely passed them by.

At home the twins spent most of their time in play with each other; there was nothing organized to keep them occupied and they were usually left on their own. They never heard a book read, nor were they told stories, and they only listened to strangers talking if they heard their own names mentioned.

In spite of all this, the twins did not give the impression of being mentally retarded. They were good, cheerful, energetic, mischievous, friendly and affectionate; their movements were sufficiently alert and rhythmic and they displayed musicality. Both were efficient during meals and with their clothes, serving themselves and refusing help. When they were placed together in the kindergarten* they willingly participated in duties, quickly orientated themselves in the new setting and did not present any difficulties to the teacher.

*A residential kindergarten where the children stay all the weekdays. [Ed.]

Further observations brought to light several peculiarities in ir behaviour as compared with other children of the same age. The content of their play was always very primitive and mono- ious and led to the manipulation of objects independently of / other aspect of the play materials provided. Not once was re observed any tendency to the simplest construction with lding materials; cubes were only piled up or laid in a row on ground. They liked large building materials but their play h these consisted only in transporting them from one corner another without any attempt to use them for building. Play of reative, meaningful character was rare and extremely mono- ious, being repeated without variations. Such games as lotto not attract their attention at all.

The twins seldom played with the other children and only asionally took part in mobile games with simple actions, such chasing and catching and 'train' which do not require strict ision of roles nor unification of the separate elements of play a general imaginative whole; they never took part in complex, aningful play nor in such creative activities as modelling, wing etc. Only after several months did they produce their t 'drawing', a few greasy marks with paint which obviously not correspond to their age.

During most of the initial period in the kindergarten they did choose to have permanent communication with any of the er children but usually passed their time in each other's com- ny. It was often observed that when another child cried they at t listened with alarm, but becoming convinced that the cry ne from some irrelevant child they at once relaxed, as much as say 'Not Liosia', 'Not Liulia'. Without each other they were tless and if one was absent the other looked for him. If one s punished, the other also cried, but if any other child was nished they did not usually react.

In spite of the great similarity between the twins there were o significant differences. Liosha (Twin B in the experiment) ighed six pounds at birth, took to the breast at once and had ver been ill. Yura (Twin A in the experiment) weighed three d three-quarter pounds at birth, was very weak, had to be kept

warm by artificial means for two months after birth and at f
months suffered from influenza with a high temperature;
began to sit later, to walk one and a half months later and v
teething later than Liosha. The mother remarked that Liosha v
more active and that Yura was subordinated by him. Nevert
less, as will be indicated below, the twins' speech developm
was at first observed to be very similar.

apter 4
culiarities in the Structure and nction of Speech in the Twins G

e initial period during which we observed the twins was in ne respects a transitional one. With the acquisition to their abulary of several commonly used words their speech became re normal, but in its structural and functional peculiarities it nained wholly primitive 'autonomous' speech. The twins G d not yet been separated and played closely together, having y little to do with the others; they usually passed their time in mitive play or occupied with simple stereotyped repetition of nipulations of objects. We were unable to register any speech iated by them with adults. Communication with adults was ited to this; one or both of the twins approached the teacher d pointed to some object which had attracted their attention. eir unwillingness to follow the teacher's suggestions was most en expressed by actions or a cry. Attempts to draw them into versation usually met with silence, though sometimes in reply a direct question they pointed at the thing mentioned. It was such a situation that the twins most often used the common rd, hardly phonetically distorted; less often there slipped in ne 'autonomous' expression denoting the given object.

Their speech in communication with each other was built up an entirely different way. Here it was observed that it most en accompanied their play and activities, it expressed their hes and invited the partner to some kind of action. In this ay' situation the words of common speech were more seldom d and 'autonomous' words, sharply differing from the mmon ones, were chiefly employed.

We may now look at the lexicology and semantics, the gram- r and function of the twins' speech during the first stage of our ervations.

Lexicology and semantics of the 'autonomous' speech of twins G

In order to analyse the lexicological composition of the speech of the twins G, we registered (by keeping a continuous record) everything that they pronounced in the course of communication with each other, and the answers they gave to adult questions during a period of some two to three weeks.

As is shown in Table 1, the words of common speech, though they were defectively pronounced,* constituted 54·3 per cent of their whole vocabulary; 34 per cent of their speech consisted of distorted words in which it was often difficult to recognize the words of common speech.†

A considerably smaller proportion, 11·7 per cent, consisted of 'autonomous' words proper, in the number of which were included expressions of the type 'ntsa' (yes, so, all right, quickly), indications of pleasure), 'aga' (so, well done, good), 'touto' (car, to go etc.), 'fouou' (a bear, terrible), 'maliaka' (bad), 'otop-top' (high, many).

Table 1 Analysis of Vocabulary of Twins G (Active and Answered Speech)

Types of word in the speech of Twins G	*Number of words*	%
Common words of narrative speech	74	54·3
Distorted words (with special meaning)	46	34·0
Autonomous words (sounds, imitations etc.)	16	11·7
Total	136	100·0

This might give the impression that words differing from those of common speech composed an insignificant proportion of t

*For example 'otki' for ochki (spectacles); 'tym' for dym (smoke); 't for stol (table) etc.

†For example 'pas' for spat (to sleep); 'a-ma' for slomàl (I broke); 'si for kìsa (a cat).

ns' language; that this did not differ notably from the com-
n speech of a normal child and so had no special psycholo-
l interest.

But closer analysis shows that, though the formal lexicological
nposition of the twins' speech seems to approach that of
mmon speech, significant peculiarities appear when the words
classified according to their meaning and use.

The first fact to be noted is the *imprecisely* expressed generali-
ion, the *diffusion* of meaning of the words in our twins' lan-
ge.

Very often the same objects were indicated by different words,
ier common or autonomous; for instance, sobàka (a dog) by
àka', 'abbà'; mishka (a bear) by 'fou-ou', 'mitka'; lòshadka
orse) by 'liasadka', 'tplu-tplu'.

On the other hand, each word did not always have a stable,
cise meaning but was used to refer to a whole group of
ects and actions. Sometimes it obviously had a generalized
ective meaning; it was clear that the twins expressed by a
d some common feature which they had distinguished in
eral related object groups. For instance, the word 'ltik'
ik, a leaf) indicated both a leaf and a flower; the word
kòka' (morkòvka, a carrot) indicated a carrot, a turnip, a
er-melon, a plum etc. Often the words indicated objects,
ons and quality at the same time: 'amà' (slomàl, I broke) sig-
ed I broke and also a hurt spot, a tear etc.; 'pipis' (pit-pit,
rink) indicated a teapot, a cup, to drink and water. Finally
e words, for instance 'ntsa', 'aga', 'op' only had
ning in dependence upon the situation in which they were in-
led.

Our observations showed, therefore, that even the words of
mon speech were used by the twins with a very generalized,
se meaning, often indicating an object and also an action and
lity. Clearly this kind of speech evinced peculiarities proper
considerably earlier phase of speech development, such as
usually observed in children towards the end of the second
the beginning of the third year of life.

is particularly noteworthy that in many cases the words used

by our twins did not have a stable meaning and only acquir meaning by entering into some operative situation.

At first glance it may seem that words which did not posse permanent, stable meanings were exceptions which consitut only an insignificant proportion of the twins' speech. Howeve detailed analysis shows that matters stood quite differently.

We registered, by continuous recording,* all the words t twins used during eight uninterrupted sessions in order to fi out the frequency with which they used words natural to comm speech and words which did not have a permanent, stat meaning. It appeared that these groups of words were not bo used with the same frequency. As is shown in Table 2, out of 1 expressions used by one, and 202 by the other twin brother were able to record only 72 (and correspondingly 65) separa often repeated words. However, if we isolate the words whi recur most often it appears that 8–10 words occupied a p dominant place in the twins' speech and that these are not cle objective words but all words which do not possess a consta meaning and are comprehensible only in a particular situation.

Table 2 Frequency of Repetition of Separate Words by Twins G

	Twin A	*Twin B*
Total number of words pronounced	194	202
Number of different words recorded	72	65
Repetition of separate words:		
Liosia	24	21
Liulia	21	21
Net (No)	11	6
Ne (Not)	14	9
Tut (Here)	9	9
Tak (So)	5	10
Seichas (Now)	4	
Vot, Von (Here is, there is)		8
Davai (Give me)		7
Nado (I want)		7

*That is, by taking a verbatim record during the observation.

ere, besides the names of the twins, 'Liosia' and 'Liulia', are common words as 'not', 'no', 'here', 'so' etc. But they ıired an entirely different meaning when they were proıced in different situations and in a different tone of voice. s the word 'Liosia' could mean: 'I (Liosha) am playing ly', or 'Let him (Liosha) go for a walk', or 'Look (Liosha) t I have done'.

s is shown in Table 3 this use of names, possessing an entirely rent meaning in different circumstances, constituted from 20 3 per cent of the twins' speech; other words which did not in ıselves possess a distinct meaning and acquired meaning from the situation (e.g. 'tak', 'ntsa', 'aga', 'eh' etc.) conted nearly half the twins' speech.

Words of common speech denoting objects (frequently having, e have noted, a diffuse meaning) did not exceed 27 to 33 per of the total words recorded. Thus it can be seen that threeters of the language of our twins consisted of their own es and expressive-indicatory exclamations, having a diffuse, ermanent meaning; while words of common speech, denoting gs, in practice constituted only a small proportion of their essions.

ıese data illustrate the basic characteristic of the children's ch; *as a rule our twins' speech acquired meaning only in a rete-active situation.* Outside this situation a word either did possess any kind of permanent meaning, or only indicated

e 3 Semantics of the Words of Twins G
ıg the First Period of Observation

of words	*Twin A*		*Twin B*	
	Number of words	*Frequency of repetition*	*Number of words*	*Frequency of repetition*
s of the twins with	2 (2·8%)	45 (23·3%)	2 (3·2%)	41 (20·8%)
ıse meaning	30 (41·6%)	92 (47·4%)	27 (41·4%)	91 (44·5%)
ıg of objects ponding	38 (52·8%)	53 (27·2%)	34 (52·2%)	67 (33·2%)
mmatical) word	2 (2·8%)	4 (2·1%)	2 (3·2%)	3 (1·5%)
	72	194	65	202

what they were talking about without disclosing sufficiently clear in what sense it was being used.

Thus the unit of their speech was not yet an independently di tinguished word, but a word which acquired meaning only in a active situation. One and the same word might possess a entirely different meaning in different situations and outside particular situation this meaning could not be understood.

Several passages of the children's speech may serve to illustra this.

1. Liosha (showing the teacher a pattern he has made with a mosai 'Liosia, vo, ntsa, aga, ntsa' (meaning: 'Look how well I've done Isn't it good?')

Liosha (looking at a picture which represents an adult giving som thing to a child, addressing Yura): 'Aga, papa, Liosia, ntsa, aga?' (i 'Papa is giving Liosha something nice, yes?')

2. Yura, approaching some playing children; 'Liulia, Liulia' (i.e. (Yura) will play too')

Yura, giving Liosha a sheet of paper: 'Liulia, Liulia' (i.e. 'draw r something')

These examples show that one and the same expression acquir a different meaning in different situations and that to evalua this meaning outside the situation was impossible.

In a number of cases the children's speech consisted wholly expressive exclamations or names. And in these cases the meani of the expressions became comprehensible only in the light of t situation.

Twin A (Yura)

1. Not satisfied with something Liosha has done in play, he gestic lates and says, raising his voice: 'Ne nàta, ne nàta, ne nàta ta (i.e. 'Don't do that').
2. Another boy is sitting on a car with which he is playing and Yu pushes him, reddens, and cries on one note: 'Ee-ee-ee.'
3. Playing, and shifting a toy from place to place: 'Vo-vo-vo-naza (i.e. 'Here ... back').
4. After this, when a paper toy is given to him: 'Liulia posaia, posai (for bolshaia, bigger).
5. Considering a toy which has been made: 'Liulia, liutze, Liuli liutze' (for luchshe, better).

win B (Liosha)

Calling Yura into a room where he is supposed to play: 'Liulia, Liulia, Liosia, tut' ('Yura, Yura, Liosha, here').
Explaining to the teacher that Yura does not want to come: 'Net, Liulia, net' ('No, Yura, no').
Crawling into a box and inviting Yura from there: 'Stsiac (for seichas, now), Liulia, Liosia, Liulia, oi.'
In play divides the table into two halves: 'Ne Liosia mesmia' (for mesto, i.e. 'No, this is Liosha's place').
Not wanting to stay any longer in the same room as the teacher: 'Liosha ne nata tut' (i.e. 'I do not want to stay here any longer').

n analysis of the role of such amorphous expressions in the ildren's speech is given in Table 4. This table shows that morphous-expressive sentences, incomprehensible outside the mediate situation, constituted the major proportion (82·6 and ·2 per cent) of the words used by the twins and that differen-ated, comprehensible sentences appeared comparatively rarely.

able 4 Character of the Expressions of Twins G and egree of Objectivity of Speech

onstruction of sentences	*Twin A*	*Twin B*
morphous-expressive sentences comprehensible outside a uation	57 (82·6%)	54 (78·2%)
1. diffuse (without objective words)	31 (45%)	24 (34·7%)
2. short, ungrammatical sentences (with objective words)	26 (37·6%)	30 (43·5%)
ifferentiated (objective) ntences (comprehensible outside situation)	12 (17·4%)	15 (21·8%)
1. ungrammatical	6 (8·7%)	8 (11·6%)
2. grammatical	6 (8·7%)	7 (10·2%)

The grammar of the children's 'autonomous' speech

Analysis of the children's expressions leads on directly to the question of the grammatical structure of their speech.

The fact that the speech of both twins was still not developed as an independent activity of communication with the aid of language, but always constituted a fragment of a concrete-active situation outside which it was incomprehensible, determined its grammatical structure.

It is essential to recognize that such 'synpraxic' speech cannot have an independent grammar, that the 'grammar' of the child's autonomous speech is, indeed, the child's concrete activity as a whole. The word is interlocked with this activity and sometimes plays the role of object (while the subject remains in the concrete-active situation), or indicates an object which is being spoken about when it is the subject that is replaced by concrete gestures and by the child's actions. In this connection it will be understood that a significant majority of our children's expressions consisted either of primitive sentences of an amorphous type, or sentences in which, despite the presence of meaningful words, one of the most important parts of speech – the subject or object – was absent, being subsumed and only disclosed in the active situation. The corresponding data are set out in Table 5.

We can see from this that amorphous sentences constituted the major proportion of expressions and that grammatically developed sentences constituted only an insignificant proportion of the twins' speech.

No special explanation is needed of the fact that the amorphous phrase in the child's autonomous speech is characterized by a complete absence of grammatical features in the connection of words, and that words joined with a common action-meaning are not as a rule marshalled in a clear grammatical sequence requiring inflections, conjunctions etc. Even in cases when the child manages to express a complex correlation of facts, his autonomous speech does not go beyond the limit of ungrammatical 'attachments'.

An example is a situation when, attempting to find a toy dog, iosha separately pronounces the words: 'Este (eshche), sapàtka obachka), este netou sapàtka' ('Still not dog'; i.e. 'the dog n't here').

Thus the twins' speech during this first phase of observation as synpraxic in its meaning and ungrammatical in structure.

able 5 Grammatical Structure of Sentences of Twins G Frequency of Grammatically Developed Speech)

ypes of sentence	*Twin A*	*Twin B*
morphous sentences	43 (62·3%)	37 (53·6%)
1. single word[a]	18 (26·1%)	20 (29%)
2. extended amorphous[b]	25 (36·2%)	17 (24·6%)
mi-differentiated sentences	14 (20·3%)	20 (29·0%)
1. sentences without a predicate[c]	12 (17·4%)	16 (23·2%)
2. sentences without a subject[d]	2 (2·9%)	4 (5·8%)
rammatically complete sentences	12 (17·4%)	12 (17·4%)
1. complete but not extended	4 (5·8%)	4 (5·8%)
2. complete, extended sentences (with object, attribute etc.)	8 (11·6%)	8 (11·6%)
otal number of sentences	69	69

e.g. 'Mitka' for mishka (bear).
e.g. 'Liulia, Liosia, aga, ntsa'.
e.g. 'Liulia ... liasatka' ('Yura ... horse').
e.g. 'Ne nata ...' ('Don't do ...').

he function of 'autonomous' speech

he data given above show clearly that the functions of our twins' peech, which was interlocked with action, differed sharply from e functions characteristic of adult speech, or even that of pre-hool children.

Soviet psychologists, taking their departure from Pavlov's ding concerning the interaction of the two signal systems, have

shown the variety of functions speech fulfils when participating directly in the formation of mental processes.

Their investigations have not only shown that the word participates in the process of active reflection of reality, ensuring the most complex forms of abstraction and generalization of real stimuli; more recently they have also upheld the view that the most complex forms of the child's orienting activity are formed with the participation of speech. The child's speech begins to participate by regulating motions and actions, then secures the transition to complex forms of meaningful play and ends by becoming the most important factor in the development of conscious behaviour. Research has shown that the development in children of the orienting, and with this the regulating, function of speech can be traced with considerable exactitude at four to four and a half years of age; just at this age it is possible to observe the intimate participation of speech in establishing new connections, in verbal control of inhibitory processes etc.[22]

Obviously, because of the peculiarities of their speech processes, our twins were deficient in so far as they lacked the function of full-value speech in the reflection of reality and in the regulation of their activity.

All the functions of speech mentioned above remained limited in so far as in their case the word was insufficiently detached from action, diffuse in its meaning, and there was not yet developed full-value speech.

In the case of our twins, then, the word could not reflect the external situation with the objectivity, generalization and profundity characteristic of speech at a higher stage of development. Their undeveloped speech could not carry out the independent function of complex orientation which is reflected in full-value narration. Finally, their speech was interconnected with direct action, had not yet developed into an independent system and so naturally, could not fulfil the role of regulation, of planning future behaviour, which is characteristic of the speech of the normal child of the same age.

In Table 6 a summary is given of the twins' speech. It will be seen that in 92 to 94 per cent of instances it is synpraxic speech

agmented expressive requests, wishes and evaluations, ful-lling the function of indicating objects which participate in an perative situation. Planning and narrative speech were almost ompletely absent in our twins.

The following examples of the twins' expressions show clearly hat narrative and planning functions were quite alien to their rimitive, undeveloped speech. The first two examples belong to ffective speech – requests; the two latter represent the indicatory, enotary function of speech.

The children are making paper doves. Yura turns to a child Valusha; Liulia, Liulia, Valusia, Liulia' (i.e. 'Valusha, make one for me too').

In play in an analogous situation, Yura turns to another child asia: 'Net, on.' ('No, him', i.e. 'No, let him do it').

Liosha, doing something with a toy horse: 'Vo, liasiatka' (for 'Vot shadka'; 'Here is the horse').

Talking about the teacher who is writing something, pointing to r; 'Liosia, aga-a, Liosia, Liulia, tak.'

able 6 Functional Analysis of the Speech of Twins G

orms of speech	*Twin A*	*Twin B*
	%	%
Synpraxic speech (connected with action)	92·9	94·3
(a) requests, wishes, evaluatory, commentary, etc.	39·3	42·2
(b) indicatory, affirmatory	53·6	52·1
Planning speech (regulating the child's behaviour)	4·3	4·3
(a) within the bounds of a situation	4·3	4·3
(b) anticipatory	0	0
Narrative speech	2·8	1·4
(a) connected with a situation (descriptive)	0	0
(b) not connected with a situation (recollective, imaginative)	2·8	1·4
eech connected with a situation (1a, 1b; 2a; 3a)	97·2	98·6
eech transcending the bounds of a situation (2b; 3b)	2·8	1·4

The beginnings of planning speech, regulating future activity, are very seldom to be discerned; usually they find a place in the active situation and do not reach beyond such expressions as: 'Liosia tavai tak' ('Liosha, give it'), 'Liulia bliasat, a ty tut' ('Yura throw here, you here').

It will be noted that nearly all the twins' speech remains connected with the child's direct action in a particular situation. It either expresses the child's relation to this situation or indicates, denotes, the things directly participating in this concrete situation. We do not yet find either narrative speech or speech which transcends the boundaries of a situation and plans future action. All this indicates that our twins' speech cannot in any sense be called really developed, objective speech, that it is not in itself an independent activity singled out from the child's direct behaviour.

Comprehension of extraneous speech

It is now necessary to throw some light on another important question: how was an understanding of extraneous speech formed in our twins when their own speech was so primitive? If the twins' active speech was nearly always interlocked in a situation, did this mean that extraneous speech was only comprehensible to them in cases when it was directly addressed to them and so was also interlocked with a concrete, practical situation?

Our first observations concerning the twins' understanding of extraneous speech led us to the opposite conclusion. At first it seemed that the children's understanding of this was secure and did not differ from their understanding of each other's speech. However, careful investigation showed that, while our twins understood perfectly speech that was directly related to an object or action which preoccupied them, they were not in a position to understand speech when it was not directly connected with a concrete situation and took a developed, narrative form. Thus their understanding of extraneous speech was subject to the same regularities as was the construction of their own speech.

In order to find out precisely how adequately the children understood the meanings of separate words, we carried out several special investigations. If the instructor suggested that the

ck out some named object or picture they did this easily and it emed that the recollective aspect of the perceived word had full lue for them. However, it was only necessary to name an object nich was absent for our twins to show a marked difference from eir counterparts of the same age. The latter were now confused d refused to point to anything, but our twins often pointed at ne of the objects before them and in so doing revealed the in- ability and diffuseness of meaning of words in their case. For stance, they would point correctly to a tram, an axe, a dog, a ove; but when asked, where is the calf? where is the lamb? – ese objects being absent in the actual situation – they would oint again at the dog, or if asked to denote a chair would point at able, so indicating the *generalized character of verbal meanings.* Understanding of elementary grammatical relations within the ounds of the visual situation was secure. The children could en understand questions which did not name the object they d to point out. Thus, they correctly pointed to the correspond- g object when asked the following questions: 'What does the e chop?' (Firewood); 'What do you write with?' (A pencil); Whose spectacles are these?' (Uncle's) etc. They easily under- ood a question requiring description of an object and produced equately descriptive gestures in answer to such questions as: What shape is this coin?', 'What shape is this ruler?' etc. They peared to be sufficiently sensitive to the inflections of verbs nich they did not use in their own speech. For example, one of e twins asked a question: 'Mama visiped koupil?' ('Has other bought a bicycle?').* The instructor, in reply, queried oupila?' and he protested 'Net, koupil', but when the instruc- r again queried 'Koupit?' he cheerfully answered 'Da' ('Yes'). However, the impression gained from initial answers as to the mplete security of the twins' understanding of speech was ong. It was only necessary to depass the bounds of the ele- ntary, indicatory function in sentences addressed to them, make a transition to speech unconnected with the direct

*The child was trying to ask 'Mama velosiped koupit?' ('Will Mama buy icycle?'). But instead of the future tense 'koupit' he incorrectly used the sculine of the past tense 'koupil', the feminine being 'koupila'. [Ed.]

situation, for it to become clear that these complex forms c speech were no longer understood by our children.

This defective understanding was revealed as soon as we turne to the developed sentence, which could only be understood there were comparison of its separate words and inhibition of reaction to some single word snatched from its context. In thes cases, comprehension of the developed sentence as a comple verbal stimulus was often replaced by a direct reaction to som separate link, and the child answered with a single word whic had figured in the question, ignoring its complex grammatic structure. Thus, during play, performing a scene which repr sented a trip in a boat up the river to a forest, one of the twir was asked: 'Where are Mama and Liosha going?' He answere 'the boat', obviously replacing the necessary answer by a simp indication of the object 'in which they were going'. An analogou answer was given by the other twin who was asked during pla which represented a journey by tram to the hospital: 'Where a Mama and Yura going?' and answered 'in the tram'.

Deficiencies in understanding were more clearly revealed i cases when our twins heard a phrase in which only one eleme was singled out from the immediate situation while the accon plishment of the instructions given involved several actions n indicated in the sentence. One example may serve as an illustr tion. The child, who was occupied in choosing subject pictur from a heap lying before him, was told: 'Put the ball here'. this task was so constructed that the child had to find the pictu of the ball among the heap of pictures before him, he was siler obviously not understanding the task and remaining confuse However, if the child was given direct instructions whereby t task was divided into two separate parts – 'Find the ball' a 'Put it here' – he accomplished first one, then the other, imm diately and successfully. Even when the child was given a doub but direct instruction of the type – 'Take out this picture and p the ball here' – he easily fulfilled these tasks. Thus *speech w completely comprehensible if it did not go beyond the bounds of t visual situation* and *did not become a complex stimulus whi sometimes necessitated an intermediate action.* But it becan

ıcomprehensible if some fragment of the instructions was bstracted from the immediate situation and action and transnded the bounds of direct reaction.

By reason of this, understanding of developed, narrative speech ften remained inaccessible to our children. In these cases they ften snatched at an element of the sentence, failing to relate this the general context, which obviously led to misunderstanding f the content of the instructions.

A single example will be sufficient to indicate the frontiers elimiting their understanding of speech. When the child who led ieir group came up and said 'Liosha and Yura, put on your ioes we are going to dance', they began to cry, which astonished ie leader because she knew they loved dancing. But when the vins were given a direct, concrete explanation: 'Auntie Maia and untie Olia have come, so now we're going to dance', Yura opped crying and began to explain 'Liosia, en, Maia, Olia, Iaia, en ...' and the twins quickly began to get ready. The arrative phrase, being a complex verbal stimulus, was incomrehensible to the twins and called forth a reaction not to its own eaning but to the situation (put on your shoes and go somehere); only mention of the teachers' names and Yura's primive 'translation' provided an opportunity for understanding it.

Such deficient understanding of developed speech meant that ie children in fact never heard a conversation or the teacher's ading. When the other children gathered round the teacher to sten to a story the twins G began to play with each other and tempts to draw them to listen to narrative speech met with no ıccess.

Thus the impression that they had a complete understanding of peech addressed to them was obviously incorrect and these bservations convinced us that their understanding of speech was mited to snatching at the direct meaning of separate words and attempts to single out from the situation the significance of structions addressed to them. As in the case of their indeendent speech, so also their perception of extraneous speech was nnected with the direct, actual situation and was delimited to rect reactions to the meaning of separate words.

Chapter 5
Experimental Development of the Speech of Twins G and Its Effect

It has already been suggested that two factors lay at the basis
the retarded speech development of the twins under observatio
firstly, a predisposition to retardation of speech connected wi
phonetical impairment, and secondly, the 'twin situation' whi
did not create an objective necessity for the development
speech as a special means of communication.

If this proposition were correct then it could be supposed th
it would be sufficient to separate the twins for a certain time
placing them in different groups in the kindergarten and th
removing that type of direct communication which hinder
their speech development – in order to create an objective nece
sity for the development of speech; that, in such circumstance
retarded speech would develop to a stage corresponding to th
of a normal child of the same age.

In order to establish the specific weight of the former factor
the speech defect (which we shall consider in more detail)* – v
introduced supplementary conditions into our experimer
Having separated the children, and thus created a situation whi
impelled them into speech communication, we singled out one
the twins – Yura (the weaker one, as has already been indicated)
and began to give him special speech training with the aim
developing a better differentiation of sounds, better pronunci
tion and, of paramount importance, the acquisition of a dev
oped speech system.

*The speech defect of the twins G was characterized by complex phone
impairment manifested in a disturbance of the differentiation of clos
related consonants, difficulties in pronouncing affricates, the runni
together of consonants and so on.

e method used in the experimental development of speech

e lessons were as follows. The child was first encouraged to e answers to questions, then required actively to name ects, and finally actively to answer questions, to repeat com- te phrases and to describe pictures. The instruction continued three months, then there was a break of two months; after- rds instruction was renewed and continued for a further six nths.

A few passages from our records will show the exercises given the beginning of the course and some of those given a few nths later. The first extract belongs to the beginning of the rse.

ructor	*Yura*
ood morning Yura.'	Silently stretches his hand.
ell, good morning Yura.'	Silent.
d you come by tram?'	Silent.
id Yura come in the mcar?'	Silent.
ho did Yura come with?'	Silent.
ith Uncle Vania?'	Shakes head negatively.
ho did Yura come with? th Fania Yakovlevna?'	Nods head silently.
es, Yura came with ntie Fania!'	Same reaction.
hat is Yura wearing today? ots' (pointing).	Yura silently looks on.
s, boots and socks.'	Yura silently looks on and smiles.

short, the usual answers to questions addressed to him were ctical actions always accompanied by silence.

After three months' instruction the same exercises produced entially different results.

ructor	*Yura*
ura, please give me the car.'	Silently hands the toy.
o, I shall not take it like that. , "Auntie Luda, take the car"' to).	'Auntie, take the car' (ato).

'Yes, the car (avto). Now Yura?'	'Car' (afto).
'Now you ask!'	'Give me the elephant' (silon).
'No, not like that. Say: "Auntie Luda, please give me the elephant"' (slon).	'Auntie Luda, give . . . the elephant' (silon).
'Good. Here is the elephant.'	
'Yura, please give me the aeroplane' (samolet, which the instructor pronounces by syllables, sa-mo-let).	'Take the aeroplane' (sa-mo-let).

Finally, after ten months of instruction the child's speech communication took an entirely different form.

Instructor	*Yura*
Picture 1	
'Who is that, a boy?'	'No.'
'Who then?'	'A grandfather' (tetuska, for diedushka).
'What is he doing?'	'He is reading a book' (k'nizku, for knigu).
'A book?'	'A newspaper' (kazetu, for gazetu).
Picture 2	
'What is this?'	'A squirrel' (pelotska, for belochka).
'How do you know it is a squirrel?'	'The tail is so bushy' (pusistyi, for pushistyi).
'Where does she live?'	'The forest.'
'In the forest?'	'In the forest.'
'But where does she live in the forest?'	Silent.
'Does she have a house?'	'She does.'
'Where?'	'On the tree' (delevo, for diereve).
'How on the tree?'	'In a hole' (dylke, for duple).
'In a hole?'	Silent.

construction of the experiment just described enabled us to
:e a double check; to verify the improvements which ap-
:ed in the speech of both children and to compare these
rovements with the peculiarities of their speech before they
e separated.

' there were an equivalent improvement in both twins this
ld enable us to evaluate the role played by the 'twin situa-
' in retarding speech development and the variations called
h in the twins' speech by the appearance of a new and great
etus to speech development. Comparing the development in
speech of each twin after three months' separation and after
of them had begun a course of speech training, we could
ss the role played by the supplementary teaching of one of the
is and the extent to which his development had been in-
nced by the formation of habits of speech communication.
/e checked the development of the twins' speech after three
ths and again ten months after the beginning of the experi-
t. We shall hereafter designate the twin who was given speech
ning (Yura) as Twin A and the 'control' twin (Liosha) as
n B.

**iations in the function of speech in twins G
r their separation**

ervations carried out during the first months of our experi-
t showed that the very separation of the twins created an
ctive necessity for the development of their speech; non-
al forms of communication, which were formerly predomi-
t, were now obviously insufficient for communication with
r people. In order to be understood, each twin, included in
general life of the kindergarten, must inevitably come to
k in order to express his wishes, to participate in play and to
id being completely excluded from the new form of the col-
ive.

he results of their changed conditions of life were soon
arent. At first our twins were silent, then they gradually began
ke part in the common life of the child collective and to speak.
he third month of the experiment, speech interlocked with the

practical situation and speech which was incomprehensible c side a situation retreated into the background, giving place various forms of speech in which the elements of 'autonomo speech had already ceased to play an important part and the p dominant place was taken by forms of speech communicat proper to this age. It is interesting to note that these impro ments appeared in the control Twin B as well as in the trai Twin A, which enabled us to evaluate them as the resultant of new situation which objectively impelled the children into spe communication.

Here is an example of the twins' speech after three months the experiment. All these sentences are still inadequate, both pronunciation and grammatically,* but now they take the fo of extended phrases, with subject, predicate and object.

Twin A

1. During play; ('Ia kotel tomik ne vislo') 'I wanted a house, di get it.'
2. Constructing a building, looking at a cube; ('Ia takoi potiavit' put on this one.'
3. In play; ('Holoso liapan') 'A good aeroplane.'

Twin B

1. Modelling; ('Liosia deliait tsolik') 'Liosha's making a table.'
2. Same; ('Ia umeit makoku') 'I can do a carrot.'
3. Drawing; ('Liulia, ne nata potet') 'Yura mustn't look.'

It can be seen that the twins' speech has not only become nota more comprehensible but that they are beginning to use, in s nificantly greater degree, the common words of the langua Special interest attaches to the fact that not only the vocabul of their speech but also its function now became radically d ferent. Before the experiment began most of our twins' spe was not differentiated from direct action and only accompan this action; now new functions appeared, orienting, planning a also narrative speech began to play a significant part in th communication.

Table 7 summarizes the results of observations undertal

*The translation does not convey either mispronunciation or incor use of verbs. [Ed.]

r three months and after ten months of the experiment. From it can be seen that before the experiment began synpraxic ch, interlocked with direct action, constituted from 92 to 94 cent of the twins' expressions but that after three months' ration its specific weight was sharply reduced. In Twin A it tituted only 44·2 per cent, in Twin B 60·7 per cent, of all essions. Thus, while there were originally only insignificant rences between the twins in the place occupied by synpraxic ch, certain differences appeared in the course of the experi- t. Control Twin B retained more 'synpraxic' expressions the trained Twin A, but nevertheless there was also a sig- ant reduction in the specific weight of primitive speech, inter- ed with practical action, in both twins.

rther analysis of the table shows which forms of speech

e 7 Comparative Analysis of the Functions of Speech re and After Separation of Twins G

s of speech	*Before separation*		*After 3 months' separation*		*After 10 months' separation*	
	A	*B*	*A*	*B*	*A*	*B*
ber of ces recorded	69	69	102	32	45	58
	%	%	%	%	%	%
npraxic speech nnected with direct ion)	92·8	94·1	44·2	60·7	33·2	25·8
requests, wishes, evaluation	39·2	42·0	11·2	12·1	6·4	10·3
indicatory, descriptive	53·6	52·1	27·4	33·5	26·8	15·5
questions, in play	0	0	5·6	15·1	0	0
nning speech	4·4	4·3	40·0	36·3	45·9	46·5
within the bounds of a situation	4·4	4·3	16·6	21·2	10·5	24·1
anticipatory	0	0	23·4	15·1	35·4	22·4
rrative speech	2·8	1·6	15·8	3	20·9	27·7
connected with a situation	0	0	15·8	3	4·3	22·4
not connected with a situation	2·8	1·6	0	0	16·6	5·3
h transcending the unds of a situation ; 3b)	2·8	1·6	23·4	15·1	52·0	27·7

improved equally in both twins, and which improvements ca assigned to the special factor of training Twin A. We may no that in both children orienting, planning speech, which not c accompanied but also anticipated the corresponding activ improved in an equal degree.

At the outset of the experiment such speech was virtu absent (it did not exceed 4 per cent of all the twins' expressio but now more than a third of all their speech (40 per cent in and 36 per cent in the other) began to be related to this categ It is clear, therefore, that removal of the twin situation led t rapid development of planning speech in both twins.

However, it is characteristic that the role of planning spe only increased to an insignificant degree in the following mon and ten months after the beginning of the experiment only c stituted 45 to 46 per cent of all expressions.

The peculiarity of this further development is that in the lowing months complex, anticipatory speech began to take a m significant place by comparison with forms of planning spe which remained within the bounds of an operative situati Three months after the outset of the experiment the latter p dominated, but after ten months it began to give place to m complex functional speech, with an orienting role which tra cended the bounds of an immediate situation.

In the case of that other form of speech, which we have ca narrative, matters stood differently. This kind of speech, alm completely absent earlier, constituted 15·8 per cent in the cas Twin A after three months but had hardly developed at al Twin B. This convincingly suggests that the appearance of pl ning speech was the direct result of the new objective situati in which speech lost its connection with direct action, but that development of narrative speech at this first stage was the di result of speech training.

Ten months after the beginning of the experiment narra speech appeared in both twins, but now Twin A, who had b trained, began to acquire complex forms of narrative speech connected with the immediate situation, while in control T B narrative speech remained more closely connected

e immediate situation and was not usually detached from

All this shows that speech disconnected from action could ter into new relations with the child's activity and thus acquire w functions.

Another important finding is directly relevant here. Very soon ter the experiment began, amorphous expressions, incomprehen- ble outside the immediate situation, rapidly retreated into the ckground, giving place to objective speech which was com- ehensible outside the situation.

This is shown in Table 8.

At first, expressions which were comprehensible outside an mediate situation hardly exceeded 17 to 21 per cent, but after ree months they constituted 81 to 88 per cent of all expressions hile only 12 to 19 per cent of expressions remained amorphous. This indicates that removal of the twin situation called forth an sential change in the structure, as well as the function, of speech; e twins' speech was transformed into speech proper to their e which utilized the generally accepted speech system; and, it is rticularly important to note, this change took place within a ry short period.

anges in the structure of the twins' speech

ie foregoing findings indicate that the removal of the twin uation inevitably called forth essential improvements, not only

ble 8 Degree of Comprehensibility Outside an tive Context of Sentences of Twins G

tences	*Before separation*		*After 3 months' separation*		*After 10 months' separation*	
	A	*B*	*A*	*B*	*A*	*B*
al number of sentences	69	69	102	32	45	58
omprehensible utside a situation morphous)	% 82·6	% 78·2	% 11·4	% 18·8	% 0	% 0
nprehensible utside a situation otional)	17·4	21·8	88·6	81·2	100	100

in the function but also in the grammatical structure of spee diffused, amorphous speech began to be replaced by a norm grammatical language system.

Table 9 gives a summary of the corresponding observations

As has been noted, originally the major proportion of twins' expressions consisted in amorphous phrases, in which the most part objective words found no place. But after th months of the experiment these phrases rapidly fell into the ba ground. Now only 12 to 19 per cent of all expressions still b an amorphous character and only in 3 per cent of cases did twins' speech continue to have the character of expressions int locked with practical activity which lacked any objective wor At the outset of the experiment more than one-third of all twins' expressions were related to this group. By contrast, ferentiated phrases, which originally constituted not more th 17 to 21 per cent of all their speech, now began to constitute 81 88 per cent of the whole. Thus, removal of the twin situation a the new objective necessity for speech communication cal forth differentiated sentences in both children.

The influence of speech training was noticed only in character of differentiated expressions; in control Twin B o 36 per cent of all differentiated sentences began to bear a gra

Table 9 Changes in the Grammatical structure of the Speech Twins G Before and After Separation

Structural forms of speech	*Before separation*		*After 3 months' separation*		*After 10 month separation*	
	A	*B*	*A*	*B*	*A*	*B*
Total number of sentences	69	69	102	32	45	58
	%	%	%	%	%	%
Amorphous sentences	82·6	78·2	11·4	18·8	0	0
1. diffuse (without objective words)	45·0	34·7	3·0	3·0	0	0
2. (with objective words)	37·6	43·5	8·4	15·8	0	0
Differentiated sentences	17·4	21·8	88·6	81·2	100	100
1. ungrammatical	8·7	11·6	26·1	45·1	15·5	17·0
2. grammatical	8·7	10·2	62·5	36·1	84·5	83·0

tical character while in 45 per cent of cases the sentence nained ungrammatical, but in Twin A the ungrammatical sen- ce began to be met with in only 26 per cent of cases while the mmatically constructed phrase began to occupy a predominant ce and was met in 62 per cent of cases.

Ten months after the beginning of the experiment these dif- ences were levelled out, giving place to other, sectional differ- es. These more specific differences which appeared as one ult of training are summarized in Table 10.

ble 10 Quantity of Developed Grammatical Sentences in the eech of Twins G Before and After Separation (Percentage)

ree of development entence	*Before separation*		*After 3 months' separation*		*After 10 months' separation*	
	A	*B*	*A*	*B*	*A*	*B*
xtended sentences	25·8	34·8	33·9	59·4	9	52
nded sentences	11·6	11·6	54·7	21·8	91	48

Here we can see that the twins' speech before the experiment sisted mainly in unextended sentences, that after three nths simple sentences continued to form the greater part of trol of Twin B's speech, while in Twin A they gave place to ended sentences; these differences between the twins remained rly noticeable even after ten months of the experiment.

f, then, the new objective necessity for speech communication to the appearance of objective speech, special training called h differentiated, developed sentences.

Ve may give here comparative examples of different forms of twins' speech after three months and after ten months of the eriment. These will assist an evaluation of the summary data out above.*

n these examples, incorrect pronunciation, which is very characteristic e children's Russian speech, must be assumed; but an attempt has been e to indicate incorrect grammatical construction. [Ed.]

Observations After Three Months' Separation of the Twins

1. Developed grammatical speech

Twin A

(a) Playing with a mosaic; 'Look I have a boat . . . I'm making anoth boat.'
(b) Same situation; 'I'm making a wheel now.'

Twin B

(a) 'How the engine sounds fast . . .'
(b) 'We have none . . .' (cubes).

2. Undeveloped grammatical speech

Twin A

(a) ('Stias ia liodku') 'Now I a boat' i.e. 'Now I'll make a boat.'
(b) ('Titskin tomik') 'Bird's house' i.e. 'I've made a bird's house.'

Twin B

(a) Proposing to his companion that he carry some cubes; ('Ehali 'We go.'
(b) Modelling; ('Liosia kopatku') 'Liosha a sausage' i.e. 'I shall mal a sausage.'
(c) Same situation; ('Schas flag') 'Now a flag.'

3. Ungrammatical speech

Twin A

(a) ('Liosha net doma delit') 'Liosha no make house' i.e. 'Liosha isr making a house.'
(b) ('Aga, ia tavit') 'Aga me stand' i.e. 'I'm standing up.'
(c) ('Schas ia delil temno-temno') 'Now I made dark-dark' i.e. 'No I'm making it dark.'

Twin B

(a) ('Schas Liulia mashina, Liosia sofel') 'Now Liulia engine, Lios driver' i.e. 'Now Yura is the engine, Liosha is the driver.'
(b) ('Kolo okliasit kubiki') 'Soon he paints the cubes' i.e. 'They w soon paint the cubes.'

Observations After Ten Months' Separation of the Twins

Twin A

'We have a picture, a boy flies on a parachute . . .'
'It's a picture . . . a boy lost himself in a wood . . . he shouted "ow",

ed the children. It's interesting. We went on the merry-go-round
h papa. I said to papa: "Let's go on the merry-go-round" then we
ught tickets and went in the metro.'

'n B

e fish drunk water ... a worm jumped up ... he swallowed it ...'
ou remember we went ... the barge, a long way ...'
e engine one headlight ...' (i.e. 'There is one headlight on the
ine').

velopment in the comprehension of extraneous speech

e removal of the 'twin situation' led to remarkable progress
only in the structure of the twins' expressive speech but also
he development of their comprehension of extraneous speech.
nitially the twins' comprehension of extraneous speech was
rply delimited; speech detached from direct practical action,
ich was not directly addressed to them or was grammatically
nplex in some way, was often not perceived by them. But once
y were included in a situation of speech communication the
ns came not only to use speech for active communication but
o the boundaries of their understanding of speech addressed to
m were significantly widened.

Now, as our observations showed, they more willingly and
ively took part in extraneous conversation, willingly listened
reading aloud and began to perceive, like the other children,
meaning of tasks set by the teacher. After only three to four
nths of the experiment we could not easily single out our twins
m the other children and were hardly able to point to an
mple of lack of comprehension of extraneous speech.

n this respect there was no particular difference between Twin
and control Twin B. Differences arose only in the course of
cial experiments which showed that Twin A, under the
uence of speech training, had developed the capacity to make
cific speech structures an object of perception and to master
meaning of complex grammatical structures a great deal more
ly than Twin B.

We undertook several additional control experiments with
h children. First they were given instructions which did not

include inflectional relations; e.g. 'pokazhi grebeshok, kara dash' ('show the comb, the pencil' etc.). Then inflectional rel tions were included; 'pokazhi grebeshk*om* karandash' (literall 'show *with* the comb – the pencil'). Sometimes the latter instru tion was given in an easier form in that, to facilitate understan ing of the relations of inflections, the pointing particle w added; 'pokazhi grebeshkom *na* karandash' ('Point with t comb *at* the pencil'). Then both twins were given sentences co posed of the same words but not placed in the same order. The varied in structure being either active or passive; e.g. 'Pe oudaril Vasi*u*' ('Petia hit Vasia') or 'Peti*u* oudaril Vasia' ('Pe was hit by Vasia') with the subsequent question 'Who was t bully?' Consequently these sentences were not equally difficult

Our observations showed that there were notable differenc between the twins in perception and analysis of sentences invol ing complex grammatical relations. Control Twin B was oft unable to differentiate grammatical constructions, but Twin was in a position to make the grammatical constructions object of perception and to differentiate sufficiently exactly t relations they expressed.

Comparative examples, which show the differences call forth by speech training of both twins, are given below.

Understanding of the relations of inflections

Twin A

1. Constructions with no inflection are carried out without difficul

2. With the transition to instructions involving inflections he eas passes from successive pointing at objects to pointing with an object an object; nevertheless he often confuses the relation of objects; e 'pokazhi karandash grebeshk*om*' ('show the pencil *with* the comb') points with the pencil to the comb.

3. Instructions with a particle; e.g. 'pokazhi karandashom *na* greb shok' ('point with the pencil *at* the comb') he differentiates at once a perfectly understands the meaning of the sentence.

Twin B

1. Constructions with no inflection are carried out without difficul

2. With the transition to instructions involving inflections he shows improvement. Continues to point to both objects mentioned: e

azhi kliuch*om* karandash' ('show *with* the key – the pencil') – ts to both key and pencil.

ven the introduction of the easier particle 'at' does not produce improvement; however, after special training he begins easily to y out instructions.

fter this training, a return to instructions 1 and 2 does not produce rentiation and the child in both cases understands the instruction nflected; even inclusion of the conjunction 'and', e.g. 'pokazhi ndash i kliuch' ('show the pencil and the key') does not produce a sition to successive pointing with the objects; it is obvious that the sposition of words – 'kliuchom karandash', 'karandashom kliuch' h the key – the pencil', 'with the pencil – the key') – is not differen- d; in both cases the child perceives the first of the objects men- ed as active and the second as the object to be shown.

erstanding of the grammatical meaning
e order of words in a sentence

A

sentence with a simple grammatical construction is easily under- d. But a sentence with an inverted (passive) construction is not ectly understood. e.g. 'Petiu pobil Vasia. Kto drachoun?' ('Petia struck by Vasia. Who was the bully?') – 'Petia'.

he repetition of sentences with an inverted structure shows that subject perceives the transposition of words and attempts to oduce it (though unsuccessfully):

eat: 'Petiu oudaril Vasia' ('Petia was hit by Vasia')
a: 'Petia oudaril Vasia'
eat: 'Vasiu oudaril Petia'
a: 'Vasia oudaril Petia'
eat: 'Petia oudaril Vasiu' ('Petia hit Vasia')
a: 'Petia oudaril Vasiu.'

B

sentence with a simple grammatical construction is easily under- d. But a sentence with an inverted (passive) construction is not ectly understood.

he repetition of both types of phrase does not show substantial rences; in both cases the subject repeats the phrase as a simple, e one, not noticing that the placing of the words and the relations flections are dissimilar in either case.

All this material permits a clear deduction as to the factors wh assist development of the processes of speech.

The essential moment, which calls forth the development speech, is undoubtedly the creation of an objective necessity speech communication.

Our observations showed that it was only necessary to rem the 'twin situation', in which direct communication with utilization of a language system was sufficient, and to pl the children in a normal situation which compelled full-va communication with the aid of speech; for elementary spe interlocked with action, to be very quickly converted into f value speech activity using a language system and sufficien clearly separated from direct action. The nature of the subjects, whom retardation in speech formation was complicated by t twin situation which hindered speech development, provid the opportunity to establish these conclusions reliably.

Our experiment showed that special speech training was n the only decisive factor in the development of the twins' spe activity. This appeared as an independent means of communi tion as a result of the new objective situation created when c twins were separated. This situation gave rise to a need verbal speech and became the most significant factor in its devel ment. Special speech training, which made speech an object conscious perception, accelerated the conscious application speech and helped the child to acquire an extended grammati structure of speech; nevertheless, it is clear that this spe training played only a subsidiary role, leaving the leading pl to the formative influence of direct speech communication.

Chapter 6
Structure of the Mental Processes in Twins G

We have described the peculiar characteristics of the twins' speech during the preliminary period of observation. The question naturally arises: was the primitive character of speech, which was not excluded from action, connected with peculiarities in other mental activities? Could we assume that this primitive speech was connected not only with peculiar forms of communication but also with peculiar attributes in the whole mental life of these children?

Amorphous speech, not excluded from direct activity, is proper to the normal child of one and a half to two years of age. At this age, because of the incomplete development of neurodynamic processes and the still very elementary forms of life, the child's mental processes are not fully developed. But we observed in our twins a clearly expressed form of this primitive speech at a much later age, from five to five and a half years. At this period the development of neurodynamic processes and of the child's forms of life has naturally moved far ahead and this provided an adequate basis for supposing that there were peculiarities in the twins' activity closely connected with the retardation of their speech which (as has already been indicated) was by no means to be explained in terms of their general 'mental backwardness'. If the rapid improvements in the children's speech communication called forth by our experiment were accompanied by similar significant improvements in the organization of their mental processes, then the relation of the organization of mental processes to the level of development of speech would have been experimentally proved.

We may now attempt to give an analysis of the peculiarities of our twins' mental life, in order thoroughly to investigate the changes in mental life called forth by the experiment.

Play activity

Both twins, when they entered into relation with other children in a situation where we could study them carefully, were sufficiently lively and mobile; they were always very active, looked after themselves very well, carried out the usual tasks of children on duty in the kindergarten, were musical and took part satisfactorily in rhythmic exercises. Their performance of simple practical tasks was no worse than that of the other children. But careful observation brought to light notable differences in the construction of their activity by comparison with their counterparts of the same age. Such differences were, perhaps, most prominent in their play activity.

The researches of Vigotsky, Elkonin, Fradkina and others have shown that it is precisely during the play of children of pre-school age, when their behaviour becomes subordinated to an imaginative pattern, that there appear those peculiar features of activity which give promise of future development, which lay the foundation for a transition to new, more complex forms of mental life.

The child of two and a half to three years is able, in the course of play, to attach to an object some conditional meaning which varies in the process of manipulation. At five to six years the child is in a position to develop complex, subjective play which stems from a definite project; this has the character of an original, active narrative in which the child begins to act a corresponding role which he retains to the end of the game and which determines his behaviour throughout the period of play. Research has shown that an imaginative situation created with the aid of the verbal system can be so stable that casual external factors cannot destroy the system of connections that the child has created with the aid of his speech.

The question arises: to what extent is this complex, meaningful play activity actually connected with the development of speech, which enables the child to proceed to complex connections, characteristic of the 'second signal system', and to build up his activities on their foundation? For an answer to this question we may turn to the data obtained during the observation of our children.

The first records, which were upheld by later material, estab-shed that our children's play activity, which reflected the whole rganization of their mental life, showed peculiarities which harply differentiated it from the play of their counterparts. *rimitive play, during which a conditional meaning was created for n object, was completely accessible to our twins. But complex eaningful play, which proceeded from some preliminary project nd involved the steady unfolding of this project in a series of play ctivities, was inaccessible to them.* This was the character of our hildren's play during the period (from five to five and a half ears) of our preliminary investigations.

Observation of their customary play clearly established these cts. As has already been noted, the children readily played with ch other for a long time, often attaching conditional meanings objects (for instance, converting a brick into a cart, a board into wheelbarrow or a horse etc.). But such play did not as a rule anscend the bounds of primitive, manipulative play with the nditionally determined object; it never proceeded farther to e unfolding of some kind of meaningful play which required the ildren to fill a specific role and revealed a comprehensible ntent.

The following extracts are based on our records of the chil-en's behaviour during this period.

bservation 1

e children are playing at horses in a stereotyped way. One of them s the part of the owner of the horse (he rides on it, feeds it, strokes it, s it to the chair); the other plays the role of the horse itself, tramples, outs and pretends to eat hay.

The children play at trams or trains in the same way; they put chairs a row, sit on them and shout 'ou-ou', 'tou-tou' or 'tin-tin' and fall the ground.

Such games are repeated many times but do not constitute part of y general plan.

bservation 2

osha and Yura are in the playroom. There are several mobile toys fore them (engines, tanks, carts), three stools and cubes. Yura has d an engine to an overturned stool and is pulling at it.

Then he takes a second engine, ties it to the other end of the sa stool and calls Liosha: 'En, Liosia, masina, Liosia' (for mashi engine).

Liosha is sitting near a boy, Alick, who is playing; he does not tu round at Yura's call but continues with his own affairs.

Yura runs towards him, goes up to the box in which they keep th large building materials, takes out several cubes and puts these on stool.

Yura sits a doll on the stool. Liosha is now sitting in the box a throws out some cubes. Yura places a second row of cubes on the sto Not finding any more similar cubes he goes away.

He is already playing without the previous interest, glancing either a cart or at Liosha who continues to sit in the box. Two of the oth children come up to the stool and sit on top of the cubes.

Liosha jumps out of the box, comes running up and shouts: 'Liulia Yura runs up and shouts to Liosha: 'Liosha, let's go'. They twi carry the stool back and forth across the room. Then they carry to the box and pile on more cubes. Once more they carry t stool.

Liosha runs out into the corridor, finds a car and brings it. Yu runs behind him, then returns and silently begins carrying the stool; shouts 'ou-ou'. Liosha carries the car from the table to the corn Yura again carries the stool to the box and empties the cubes on it in the pile.

Another boy, Iliusha, runs up to them, takes the stool, carries away and throws it down. Liosha runs to the stool, brings it once mo to the brick box and begins to put cubes on it. Yura leaves the car a helps him. They pick up all the cubes from the floor and put them c the stool.

Liosha seats himself in the front. Yura pushes the stool from behin he shouts: 'Tavai!' ('Davai', 'let's go'). Liosha imitates a gestu of taking up reins, he shouts: 'Tpr!' Yura begins to push t stool.

The same kind of play goes on. The children carry the stool acro the room, once more throw the bricks away and then pick them up a put them on the stool. The play continues.

These records indicate that the play of our twins differed sharp from that of their counterparts. The normal child of five to s years old transcends the bounds of the directly perceived situa

ion, his actions are subordinated to imagination and he can reate a relatively complex project in play. It was precisely this hat remained inaccessible to our twins; in their play they were ubordinated to such an extent to connections directly called orth by perceived objects that each object called forth several irect actions and play consisted of a repetition of stereotyped eactions.

Analysis of the imitative play of our twins led to the same conlusions.

Research concerned with the pre-school child has shown that nitative actions reveal particularly clearly tendencies towards rther development. The child, when imitatively entering into a omplex situation, is able to imitate actions which he cannot yet ccomplish independently; and it is as a result of his inclusion in is way in more complex forms of activity that he is able to pass n to the stage of acquiring these actions independently.

It is particularly interesting, therefore, to discover the extent o which our children could imaginatively take part in complex orms of meaningful play which they were unable to master ndependently at this period.

Our observations showed that the twins quite often took part n collective games. Once the child collective started mobile play lancing, chasing and catching, mock fights) our twins immeiately joined in. But their participation did not depass the limits f affective participation in a common game, in common mobile ctivity; the significance of the play, any allocation of roles, the ules of a game, these remained entirely inaccessible to our chilren. They were drawn into the external, ritual side of play ctivity but remained outside the meaningful aspect.

Several examples may be given to illustrate this.

oth twins readily take part in rhythmic exercises; readily run about ith the other children or play at school (not, of course, filling any role this game but rather participating in direct actions connected with

.

But they never participate in play involving fixed rules; thus they ave often watched the game of lotto but each time have gone away

without taking part. When they were given lotto and the necessa explanations were made,* they mechanically laid out and relaid t pictures but did not proceed any further.

A typical example of external, ritual imitation of a game was the play with forfeits. The twins had often seen how the other childr played, throwing up the forfeits and winning the picture on which o fell. Today, after looking on, they began to play themselves. As h been noted, in imitative play the twins never reproduced the intentic but only the external process; therefore in this case, when the gan itself had a manipulative character, their imitation produced resul which did not differ from the norm and their participation in gener play became possible.

On the other hand, when external actions in play covered some kin of conditional meaning or rule, imitation became impossible and t twins dropped out from the play of their counterparts.

Consequently the primitive character of the twins' activity wa manifested not only in their independent activity but also in thei imitative activity; analysis of this showed that complex intelle tual forms of communication were almost inaccessible to them

This goes a long way towards explaining why their prolonge participation in the collective (up to the time of their separatio did not result in so much improvement in their behaviour a might have been expected.

The limitations of the twins' understanding of meaningful pla activity were most clearly revealed in special experiments designe to analyse the extent to which they could attach conditiona meanings to objects.

Utilizing a method initiated by Vigotsky, we offered severa objects to our twins which were to acquire a conditional meanin in play; thus a penholder acquired the meaning 'papa', a penci 'mama', a wooden ring 'the house', a box 'the tramcar', an ash tray 'work'. Using the corresponding objects we played out th following project: 'papa travelled to work in the tram'.

The experiment showed that our children easily understoo

*As played in the kindergarten, a game with cards bearing different pic tures, which are dealt out, and a board with corresponding pictures on it One child calls the name of the picture and the holder of the card designate lays it on the corresponding picture on the board. [Ed.]

ɔth the agreed meaning of the object and, too, any change in eaning indicated by a gesture. Thus, when the experimenter ok a small metal spoon and imitated chopping movements with the children, asked what this was, answered 'an axe'. When e experimenter picked up a knife and pretended to sweep the ɔor, the children at once said 'a brush'.

This proved that where there was manipulation of objects the gnificance of an object could easily be changed. That a transpo-ion of this kind should be so simply effected is easily under-ɔod when it is recalled that the children's own speech was not t detached from direct activity. Nevertheless, our observations ry quickly revealed the limitations to their application of con-tional meanings. It was only necessary to separate the meaning rbally attached to an object from direct action for the children be unable to master it and to show a tendency to resist in der to remain in the sphere of the visual practical situation.

Thus, when the experimenter gave the children a penknife and, ɔt having peformed any action with it, told them that this was a ush, the twins took the knife and, ignoring the verbal indication, egan to sharpen a pencil with it. Now, even if the experimenter emonstrated the conditional action of sweeping with the knife, nd then passed it to one of the twins with the words 'Take this ush and sweep', Liosha (or in other experiments Yura) took e knife, looking altogether perplexed, glanced at the experi-enter and began again to sharpen the pencil.

Thus, *though they could acquire the conditional meaning of an ject in the process of concrete activity, our twins were unable to rceive this meaning when it was given to them verbally*, nor could ey actively develop the activity determined by that verbal eaning. The experiment showed that they were unable ade-iately to refer to a verbal indication; when the experimenter id 'Shall this be a brush?' both twins shook their heads nega-ely and when the question was repeated answered 'it's a knife'.

Though, therefore, *they could easily be included in a visual play tuation, our children were unable, either independently or accord-g to an adult's verbal indication, to change a meaning and to tain this changed meaning.*

Peculiarities of constructive activity

The peculiarities characterizing the speech of both twins, it inseparability from action, inevitably implied that they were nc in a position to formulate a project such as would determine th direction of their constructive activity. This explains why we di not note any consistent constructive activity during the pre liminary period of observation. *In cases when the situatio demanded that the children act in accordance with some projec that they realize this project in some developing constructive activity their actions did not depass the limits of helpless manipulation o objects and there was failure.*

During this period we did not observe even primitive drawing When we gave the children a sheet of paper and a pencil, o attempted to encourage them to imitate other children drawing our twins limited themselves to simple scribbling which did no represent anything at all. The children themselves did not nam their drawings; they rejected several titles proposed by the experi menter and even when pressed to agree that a designation o some detail was correct they at once rejected this designation.

Similarly, constructional activity with building materials wa inaccessible to the twins. When it was suggested that they buil something with small building bricks, a simple task for a five yea old, our twins were unable to comply; in their case the process o building according to some plan was reduced to casual laying ou of any separate cubes which lay handy. The following observa tions illustrate this.

An experiment with Yura (A)

Yura is at the table; before him are several boxes with cubes of dif ferent sizes. The experimenter suggests that he build something wit them.

Yura is silent for a long time, then puts a cube from the nearest bo on to the table. Still silent. Takes a second similar cube, places it by th first. Takes a small board, which is sometimes in the brick box, hold it in his hands. The experimenter persuades and encourages him for considerable time. Yura is silent.

n experiment with Liosha (B)

me situation. Liosha has a finger in his mouth, smiles confusedly. In moment, takes a cube from the nearest box and places it on the table; kes out the next one and places it beside the first; he pays no attention other cubes.

Lays out a row of cubes in a stereotyped way. Changes the position one of the cubes in the row to horizontal, then does the same with the mmetrical cube at the other end of the row. Moves the horizontal be to a sloping position and continues the row, placing cubes like a dius; around them is laid out the outline of a circle. The result is a sign made up of equivalent cubes. When asked what this is, he plies: 'A house'.

'hile a plan which could determine further constructive activity mained inaccessible to the twins, it is obvious that external ndirect factors' easily 'mixed in with' their constructive activity d directed the course of their actions.

Thus when it was suggested that they build something with nall bricks, while at the same time some large circular boards ere left lying on the table, our children were easily influenced to place constructive activity by simple laying out of single cubes ong the outlines of these circles; thus the verbally designated sk was replaced by elementary activity, subordinated to ternal, directly perceived factors.

The following are typical examples of such operations.

periment in executing a construction with bricks

n the table is a box of cubes. Beside it an overturned lid with a cture on it. It is suggested to the children that they build something th the cubes.

Liosha (B) turns the lid over and begins to lay cubes on top of the cture. At the same time Yura (A) lays out cubes along the edges of e lid, selecting them according to their thickness.

Liosha, glancing at Yura, also begins to lay cubes in the lid. Selects bes corresponding in thickness to the depth of the lid, sometimes tting two thin cubes together for this purpose. When he runs short of bes, shows dissatisfaction. This process continues for ten minutes.

Experiment with mosaics

The children are given a round board with hollows and a correspondi collection of balls. It is suggested that they lay out some kind of patte Both twins begin to fill the holes of the external circle, following t shape of the frame. They have no plan, their action is entirely det mined by the structure of the available field. Having filled one circ the children pass to the next one, filling that too in a stereotyped wa Having filled up all the holes they stop and go away.

A similar helplessness was apparent when they were asked make a pattern with mosaics. The verbally given task appear to be inaccessible to the twins and instead of laying out a planned figure, they simply started to lay out one ball aft another, following the outlines of the circular board until th had filled in the whole circle.

It will be understood that any kind of constructive activi which involved copying models[24] remained completely inacces ible to our twins. Instead of following the model, they eith picked up separate cubes and began to lay them out in a stere typed way to make a flat pattern, or produced a disorderly pile cubes. Our investigations proved, therefore, that *constructi activity in accordance with a verbally formulated task was beyo our twins, who could not themselves formulate the task verbally a so provide a reinforcement when the corresponding activity bega*

Peculiarities in intellectual processes

In the light of all that has been said, it is necessary to suppo that the intellectual processes of our twins, in particular the pr cesses of abstraction and generalization (which are known to closely connected with language), were not established in t same way as those of their counterparts; in other words, that t observed features of their speech development had led to peculiar retardation of all the intellectual processes connect with speech, in particular the processes of abstraction a generalization.

We may illustrate these points from records relating to th operation of classifying objects; an activity which, as we esta

hed by control experiments, was completely accessible to the rmal child of five to five and a half years.

The children were required to single out one object from among variety of objects (toy animals, wagons, engines, plates etc.), en each child had to select other 'appropriate objects' to make some unitary group. The kindergarten children of five to six ars easily accomplished the task of uniting objects into groups; ey usually reproduced some kind of concrete situation–'a school', street', 'a kitchen'–or else generalized objects according to some mmon feature – made of iron, made of wood, animals etc. The twins, however, though they could easily correlate objects the course of concrete activity, were entirely unable to syste-tize them, to unite them in separate groups; the very process classification, primitive though it is, remained entirely in-cessible to them.

As a rule, instead of *classifying* the objects, our children merely gan to *range them* together one after another, either playing me kind of game or setting them out inconsistently along the ges of the table.

These experiments contribute important material for analysis the construction of the twins' intellectual processes. Their tivity as a whole is determined by the fact that *the process of rrelation of objects arises only in the course of direct action*; it es not yet exist as an independent operation of generalization, lated from action and realized according to the abstract egories provided by a language system. An operation which the rmal child of this age can easily accomplish with the aid of ech, the generalization of objects according to concrete nilarities, was inaccessible to our children. Their speech itself, ce it was not separated from action, could neither generalize objects nor organize and direct activity. In other words, the eration of attributing objects to certain categories, the task of ssification, which is realized on the foundation of 'a new nciple of nervous activity' – abstraction and generalization – s impossible for our children. To their primitive speech, inter-ked with action, corresponded a primitive organization of ivity subordinated to direct action.

Chapter 7
Variations in the Structure of Mental Activity in Twins G with the Development of Speech

We have described those peculiarities in the organization of th twins' mental activity which were integrally connected with th elementary character of their speech processes. Since the speech was not yet singled out from direct activity it could nc fix a verbal project, could not give to their activities a steady goal-directed character and so subordinate them to a specific ir ternal plan. It is clear, then, that the radical improvements in th twins' speech activity called forth by our experiment could nc but be reflected in the whole structure of their mental processes

With the appearance of speech disconnected from actior indicating an object, actions and relations, it was to be expecte that there should also arise *the possibility of formulating a syster of connections transcending the boundaries of the immediat situation* and *of subordinating action to these verbally formulate connections*. It was to be expected that this would also lead to th development of complex forms of activity, manifested in play a 'the unfolding of subject matter' which would give play a stead character. Finally, such a reorganization of mental processe under the influence of developing speech could be expected t change the child's attitude to the product of activity; that is, b comparison of the result obtained during the process of activit with that system of connections which underlay the project, th child ought to reach a position where he could objectively evaluat this product apart from his activity and consequently also take u a critical relation to it.

In other words, we had every reason to suppose that th acquisition of language would introduce important new pecu liarities in the structure of our children's mental processes.

The observations recorded during the experiment proved thi general hypothesis.

A check carried out three months after the twins were separated owed how great was the progress both had made during this ort time. We may give here a brief analysis of the changes bserved in their mental processes in the course of play and in the rformance of special intellectual tasks.

provements in play activity

has been noted that before the experiment both twins were ually excluded from general meaningful play engaged in by the ildren of their group. Three months after the experiment began e position had sharply changed. Both twins, having been aced in different groups of the kindergarten, were less cut off om the general play activities of the other children. Their play early revealed elements which far surpassed the very simple anipulations that had formerly been characteristic. We may ve here a record illustrating the type of play characteristic of th children after three months of the experiment. For the pur-ses of comparative observation the twins were placed to-ther, though they were usually in different groups.*

e twins are in the playroom; before them are several play materials alogous to those used during the preliminary observation.

The children take a stool. Yura (A): 'I'm the driver.' Liosha (B): Now Liulia engine, Liosia driver'. Yura points at the brick box: 'To ild a house.' Liosha, turning to the instructor: 'May we have cubes?' tting permission, takes these.

The instructor removes a flower which was on the box. Liosha: Where's the flower?' Loads cubes on the stool. Yura points out where should carry them: 'Go there.' Liosha carries the stool. Yura stands performing an action like a railway signal: 'Stop, oi.' Liosha, sitting, kes a noise like a horn.

Yura takes cubes from the box and making a noise throws them on stool. Instructor: 'What are you doing Yura?' Yura: 'Laying es. Now it's good, a good house, but Liosha isn't. Liosha no make se.'

nstructor: 'What is Liosha going to do?' Yura: 'Drive away.'

Liosha, carrying cubes, stops, says: 'Heavy.' Carries the box going

*In this and the following examples faulty pronunciation must be amed. [Ed.]

along on his knees; Yura points out the direction, lifting his arms like railway signal. Liosha stops. They carry the cubes to the opposi corner of the room. Liosha sits on the floor. Yura: 'Now I know, tl metropolitan.'

Liosha is sitting on the floor. Liosha: 'Show me.' Yura points in lively way. Then, turning to Liosha, says: 'Liosha carries cube Begins to build a house. Liosha sits, observes and sometimes mak remarks.

Yura follows the plan he has adopted. 'Now I made dark-dark, ho it was, remember?' He puts on more cubes and looks inside. 'Dar No.' Liosha: 'A bit dark (here he corrects himself) a little bit dark, v must do some more.' Begins to help Yura to build: 'How dark.' Yu looks and says: 'Dark, look.'

Shows Liosha where to go for cubes. Yura: 'Now there's still t circle there.' Liosha gets to his feet, whistles and they go off. He goes a circle, Yura after him. They arrive at the place, sit down and load c cubes. Afterwards they again convey them to the spot and contin their building, checking to see that the inside is dark.

First, what sharply distinguishes this play from similar play de cribed earlier is the abundance of speech which was former absent. Evidently this difference was not merely external. Com plex speech, with which the twins now began to accompany the play, fulfils an essential function; from the outset it is a form the child's orienting activity, bears the character of analysis of th play situation and realization of the play project which is deve oped through a complex unfolding of several stages of the subje matter of play.

From the outset the children single out a project and they fo mulate it verbally; this project falls into several stages (loading u and transporting the cubes, building and then additional carting these different stages are reflected in speech which singles thing out, fixes the play situation and plans the succeeding activity; th play gestures cease to be ritual and acquire an objective, indic tory character (for instance, 'signalling', which one of the sub jects performed twice).

Separate objects are not merely used in this or that process play, but take on a permanent significance in its context. What particularly important here is that this meaning is retained durin

e whole period of play; the meaning arises not from direct tion, but from a verbal formulation of the project ('metro- litan', 'dark inside' etc.); there appears a relation to the oduct of play (evaluation, checking of how the project is ful- led); in short, the whole process is radically changed, and play, om being a ritual, becomes fully objective and meaningful.

In the last analysis this meant that the children were now in a sition to *detach themselves from the immediate situation, to bordinate their activity to a verbally formulated project* and so *stand in a new relation to this situation.* It is characteristic that is improvement appeared in both twins, and this permits us to duce that it was connected with the objective notional speech hich arose in them at this period.

provements in constructive activity

substantial improvements were registered in the conduct of e play, constructive activity showed even greater improvement. Formerly, as has been shown, any kind of real constructive tivity was inaccessible to our twins. Now that the children were a position not only to exclaim and to apply separate meanings sing during the course of activity, but also objectively to for- ulate their projects, productive activity began to be possible. is took place according to the clear phases of a verbally for- ulated project, preparation of activity and its realization; now e product of activity 'already existed in the imagination . . . at e commencement'* and it was precisely this that created tirely different relations to the process of creation and its tirely different end product.

We began with observations of modelling and drawing. ither of these processes was accessible to our twins during the st period of observation; now both these activities flowed dif- ently.

*The reference is to Marx: 'A bee puts to shame many an architect in the nstruction of her cells. But what distinguishes the worst architect from the t of bees is this, that the architect raises his structure in imagination ore he erects it in reality. At the end of every labour-process, we get a ult that already existed in the imagination of the labourer at the com- ncement' in Dona Torr (ed.) (*Capital*, London, 1946, p. 157 – Ed.).

The children are given plasticine; they are separated from each oth by a screen. It is suggested to them that they model something; they a told not to talk to each other. Yura (A) is unable to stop talkir Liosha (B) is silent, nevertheless he always reacts to Yura's words.

Yura: 'I'll do a house.'

Liosha: 'And I a sausage. Liosha can do a house.' The instruct reminds the children that they are not to talk to each other.

Yura: 'I want to talk.'

Liosha: 'Liosha a sausage (he laughs) Liosha's talking.'

Yura: 'Aga, he said' – here he continues to talk aloud to hims about what he is doing – 'now one more little leg.'

Liosha, having heard this, also begins to make a table; looks at t table in front of him and, passing his hand round the four edges say 'So-so-so-so' and begins to model.

Yura: 'Now a leg, I've finished the table.' Both finish making a tab There result certain objects; Yura's is the better, more differentiated table with four legs) and Liosha's more primitive (a table with tv legs).

Yura continues to hold the plasticine. 'What else? A carrot'. I models a small carrot. He makes the ends so that it looks like a bott 'Now I have a good bottle. Liosha can't do a carrot.'

Liosha: 'He can.'

Yura: 'A bottle. But can you do a bottle?'

He plays with the things he has made; the bottle stands up, the carr lies beside it. 'Now I'll put the carrot here.' The play continues.

The children make sausages, biscuits, little boys, they play with thes When the plasticine is finished Yura says: 'Give me more clay. I' good ...' – at modelling.

Completely analagous improvements were observed in th children's drawings. Instead of scribbles there appeared goa directed, differentiated, objective drawing.

It is characteristic that this basic improvement – from el mentary manipulation of materials and meaningless scribblin with a pencil to drawing activity of an objective character occurred in both twins and reflected the ability verbally to fo mulate projects which was formed in both children at this perio

This process of formulating a project was most clearly to b observed in another operation – the cutting out of paper shape The following passages from our records clearly illustrate this.

The children are cutting out paper shapes. Yura (A) joins them, cuts out a figure: 'I have a fish . . . now eyes.' Takes a pencil, draws eyes for the fish. Tries to stick the drawing, dirties it, starts to cut out a new one. Produces a figure. 'Here's a fish, what a mouth'.

Noticing Vasia's fir tree: 'Now me too.' Begins to cut out, cuts out a figure: 'Like in Vasia's book.' Cuts up its edges, says again: 'A fish.' Cuts off a part of the drawing which is stuck on and says: 'A little handle.' The remaining part is stuck on in the same way: 'This is a bottle.'

The teacher shows the children the work of one of them and says: 'Look at this house, children, it even has a flag.' Yura at once takes the scissors in order to cut out a flag.

One of the boys calls him to come and build a house. Yura, continuing to cut out, answers: 'Soon'; continues to cut out a flag; the flag breaks. Yura begins to cut out a new one, the boy again comes up and calls him. Yura does not answer. Continuing to cut out says: 'Here's a flag. Now I'll cut out another flag.' Starts to work again.

These extracts show that all the child's actions bear the character of intelligent realization of a project, one which, once formed, begins to subordinate the child's further activity.

Now that the twins' activity began to be determined by a project formulated in speech, they were capable of resisting occasional external influences and of realizing their project independently of these irrelevant influences. This can be illustrated by an experiment in laying out mosaics.

As has been shown above, this process was not accessible to the children during the preliminary period of observation; their activity was limited to the passive laying out of mosaics along the outline of the given form. Now this activity gradually became possible. This is how it proceeded, in the case of both twins, three months after the experiment began.

Yura (A) takes the board and from the outset lays out red balls round the outside, then, filling in one contour of the board with brown balls, a second with white and a third with red, says: 'Look what a boat I have, now I'll make a flag.'

This process differs greatly from the meaningless laying out of balls along the outlines of the board; the vector of the external 'field' has ceased to play any role.

Same situation. Takes the board, begins by laying out radial out lines; afterwards fills in each sector with balls of different colours. Ask whether he has done it well. Asked what it is, answers: 'A little circle'

After this puts the balls in the box and says: 'Now a boat.' Begins t make a new figure, says: 'Look at this.'

The constancy of the verbal project and the independence o action from accessory external influences indicate the radica improvements which had taken place in the twins' mental activit at this time.

It remains to note two final moments which were alread established a few months after the experiment began and whic appeared to be extremely characteristic: that is, *the stability o productive activity* on the one hand and *the children's active atti tude to the product of this activity* on the other.

Observations carried out during the preliminary period showe that it was usually very easy to divert both twins from thei primitive play activity which had no defined subject matter. The easily switched over to some other activity, leaving the game the had started, and did not independently take up the discarde activity again. There did not arise that 'mental tension' whic was characteristic of the meaningful play activity of their counter parts.

It was precisely this peculiarity that changed radically durin the first months of the experiment. Passing over to developed complex, meaningful play, our twins were not only in a positio to develop this in adequately complex forms but also revealed tendency to return permanently to a previous activity. Now it wa no longer easy to distract them from meaningful play and the did not easily leave their play as before.

Here is an illustration of this

In the evening Yura was busy building a 'metro'. He carried the cubes built a 'station' and a 'tunnel'. According to the teacher on duty, h took a long time to go to sleep, contrary to his usual habit – 'he wa thinking all the time about the metro'.

The next day he returned to this building first thing in the morning He sharply protested when his partner in play proposed demolishin the construction. 'Why knock it down, I want to play,' and continue

build. When any of the other children tried to take some cubes, he ok them back, restored the building and returned to playing with it.

is extract from our records demonstrates that complex and aningful play, making use of stable objects, brings to life new ms of affective relations, which acquire the character of a ady tension continuing throughout the period that the verbally mulated objective activity continues.

Similar significant improvements were observed in the chil-en's attitude to the product of their activity.

During the preliminary period of observation our twins easily ssed from one form of manipulation of objects to another, ereby revealing that they did not have any evaluatory attitude the forms of objective organization of play. Now this attitude dically changed and the children began to compare the product activity with the original project, to evaluate it, and, where pos-le, to improve on it. Here are examples of such evaluation.

ra (A) watching how other children lay out mosaics remarks that y have been laid out wrongly, says: 'No, not that way . . .' and re-kes the pattern.

Yura, watching other children drawing, says: 'Bad . . . Bad . . . You ke it very bad!'

When cutting out, he is not satisfied with the results of his own work; begins to cut out another shape. When the experimenter gives him a ghly cut out model, he first smiles, then says: 'Not that way' and s out another himself.

is material, taken as a whole, permits us to draw some general nclusions. Only three months after their separation sharp provements could be observed in the twins' activity. These re expressed in the fact that *the children's attitude to objects an to be seen, not only in the process of direct activity, but also the form of projects formulated in their own speech* which was w separated from action and in a position to subordinate ion. Parallel with this, *play activity also developed* and became ferentiated into separate moments which did not have an uivalent significance (project, preparation of the activity, its filment); an objective relation to the product of activity arose; new system of reinforcement of intellectual activity was

All these improvements took place within a very short perio during which, of course, natural 'maturation' played only a insignificant role but which was marked by the introduction of a important new factor in the shape of a leap forward in spee development. This permits us to deduce that improvements in th productive activity of both twins took place in close connecti with the acquisition of a language system which introduced ne potentialities for the organization of the child's mental life.

Improvements in intellectual operations: the appearance of inter-pair differences

The facts outlined point clearly to significant psychologic improvements in both twins as a result of their inclusion in ne forms of speech communication and in connection with th acquisition of an objective language system. It only remains t throw light on one final question; what influence did the speci training in speech, undergone by one of our twins, have c development? We may deal with this question by analysing th intellectual operations which showed the greater degree o improvement in relation to this training.

As has been shown earlier, the separation of the twins wa accompanied by an essential supplementary factor; one of the (Twin A) was given systematic exercises during which he wa specifically trained to speak. These lessons have been describe they took the form of dialogue conversations, verbal analysis o pictures, the relating of stories.

Did these supplementary lessons give rise to special improv ments in the twin who received speech training? Did he differ i any way from the second twin who was not trained in speech?

Observations undertaken three months after the experimen began showed that notable inter-pair differences had arisen whic had had no place before.

As has been pointed out, up to the time of separation Yur (Twin A) was the weaker, Liosha (Twin B) the more active. It only necessary to analyse the extracts given above, from record of the play of both twins, to be convinced that the position ha been reversed. Now the trained twin Yura (Twin A) began to tak a more and more leading part; as regards speech activity h

eatly surpassed his twin brother; in play he never let the initia-
ve out of his hands, first formulating the project and then taking
e active role, while Twin B only followed him. It is characteristic
at such a change of roles only appeared in those forms of
tellectual activity connected with verbal formulation of a
oject; in mobile games, in running, in motor activity in general,
e were unable to observe any such difference; here, as before,
osha (Twin B) retained the superiority.

Steady and clear inter-pair differences could be observed in the
culiarities of operations realized with the aid of speech.

As has been shown above, significant improvements in these
erations were recorded for both twins; nevertheless, notable
ter-pair intellectual differences came to the fore. These were
early shown in special play which involved attaching a con-
tional meaning to things, as well as in the creation of a play
tuation already described above.

This is demonstrated in the records of an experiment in deci-
hering and active organization of play which involved attaching
nditional meanings to objects. This was undertaken after ten
onths of the experiment.

oth children are asked to play out several examples of a game which
volves attaching conditional meanings to objects. They are told that
e pencil is 'mama'; the vase, 'a tree'; the spoon, 'a wolf' etc. The
me, which comprises subject matter covering corresponding things,
played out with the aid of the objects.

The differences between the twins are here very substantial.

Twin A deciphers the meaning of the gesture game at once, during
anipulation of objects; decoding does not present any difficulties to
m and he immediately describes the whole game verbally: 'The engine
ives along, the mother wolf runs, the little wolf goes up the tree,
ama comes out of the house, sits on the engine, takes the boy' etc.

When asked to make up a game independently with the same
jects, does this easily; some of the conditional meanings are re-
ined, others created anew. 'Mama caught a hare, the wolf ran to look
r the hare, the engine drove along, the hare was in the house with
ama, it jumped through the window straight onto the fir-tree . . .'

The same operation was performed altogether differently by Twin B
ho had not undergone speech training.

He could not decode the stories related by gestures immediately bu was only able to do this in parts and then only in reply to questions pu to him. When asked to repeat the game, he repeated it without an changes, as it had been shown to him by gestures, and when asked t give new meanings to the objects he refused.

The clear differences revealed here – in relation to decipherin the meaning of a game and, what is more important, to develop ing it and operating freely with new verbal meanings – must b attributed to the special training in speech of one of the twins.

Further significant differences appeared in the comprehensio or perception of speech.

These were demonstrated when, after ten months of the exper ment, a simple story was read to the children and they were aske to relate its content. Twin A, who had undergone speech trainin began to relate the story adding supplementary points in answe to questions; but Twin B did not relate the story on his ow initiative, saying that he had forgotten it, and only reproduce details in the course of subsequent dialogue.

Similar divergences appeared when pictures were describe An example may be given which shows significant differenc between the twins in verbal reproduction.

Both children are given a picture representing a mother and a girl the table; a cat is sitting on the floor near them.

Yura (*Twin A*)
('Devochka plachet. Kiska lezhit. Mama sela na toul (stoul). Na tso (stole) tsoit (stoit) hleb. Kolevat (krovat) na polu tsoit. Na tsole hleb 'The girl is crying. The cat lies down. Mama sat at the table. The bre is standing on the table. The bed is standing on the floor. The bread on the table.'
The question is put to him: 'Why is the girl crying?'
Yura: 'The cat scratches.'
'With what?'
Yura: 'With paws.'
'Why?'
Yura: 'Doesn't give milk.'

Liosha (*Twin B*)
('Kiska. Devochka. Mama. Kaliavat (krovat). Okino (okno). Talel (tarelka). Piliagi (pirogi). Iatsik (iashchik). Tsol (stol)'.)

ıe cat. The girl. Mama. A bed. A window. A plate. Cakes. A box.
able.'
e question is put to him: 'What is the girl doing?'
sha: 'She's crying.'
hat for?'
sha: 'Don't know, she wants a drink.'

e children are given a picture representing a storm at sea and a boat
h people in it fighting the waves.
ra (Twin A)
lavaet na lodi. Palkami lipki (rybki) loviat. Devochka sidit c
moi. Paliahody (parohody) ezdiiut. Chemodan tsoit (stoit).')
oat in the boat. Catch fish with the stick. The girl sits with mama.
e ships are sailing. The trunk stands up.'
sha (Twin B)
Na lodke kataiutsia. Chemodany. Diadenka. Devochki. Mole
ore).')
ney ride in the boat. The trunks. An uncle. Girls. The sea.'
separate questions about the meaning of the picture answers:
on't know.'
ese records show how clear the differences now were in the
ldren's speech activity.
The first twin gives, as a rule, a sufficiently developed judge-
nt, describing separate actions represented in the picture. But
untrained Twin B, in his descriptions of a picture, remains
hin the bounds of the denotary function of speech and does
t make the transition to independent description of the subject.
This difference between the twins was most clearly demon-
ated in their ability to analyse the component parts of a draw-
.
n order to discover peculiarities in visual analysis, both
ldren were given drawings with several deficiencies (a man
hout a nose, an ear, a hand etc.) or drawings in which some of
details were obviously absurd.
Analysis of their answers shows that Twin A quickly detected
urdities in a drawing, quickly pointed out what was missing
the drawing of the man, or formulated in speech what he
rded as wrong with a drawing as a whole. On the other hand
untrained Twin B singled out faults with significantly greater

strain, and it was impossible to make sure whether he saw on the defect in some outline or the defective meaning of a drawir as a whole, because he did not single out the place of the defe and only evaluated a drawing as incorrect after detailed que tioning.

All this demonstrates that speech analysis of perceived materi became notably different in either child and that the substanti role in determining these differences was played by the speci training in speech of one of them.

The inter-pair differences observed were not limited to tl processes of visual analysis; they were particularly clear disclosed in the case of intellectual operations, above all t operation of classification.

During the preliminary observations, the operation of classif ing objects was entirely inaccessible to both twins; neith depassed the limits of simple setting out of the objects. But aft ten months of the experiment this operation was accessible both children. Both readily took part in this task, formulated it speech, chose objects which resembled each other and plac them in corresponding groups in accordance with a definite ai Nevertheless clear differences were observed both in the mann of selection and in the structure of the groups of objects forme showing once more the divergence between the twins as a resu of the special training of one.

Extracts from the relevant records indicate these differences, relation to the task of classifying pictures.

Yura (A)

For a long time does not begin to assemble pictures himself. T experimenter shows a blue flower.

'What goes with this?' Yura is silent. Experimenter (taking a pictu of socks): 'Do these go?' – 'No.' 'Or these?' (some other flowers) 'They will go.'

Then Yura is silent for a long time and finally places a pictu representing blue trousers.

Experimenter: (giving a red flower): 'Will this go?' Yura nods h head. Experimenter gives a picture of some berries. Yura: 'This is currant.' Then adds to this a potato, swede, radish, carrot, cucumbe strawberry, raspberry.

Experimenter: 'Will anything else go there?' Yura shakes his head gatively and begins with a new lot of pictures: an aeroplane, bicycle, r, chair, armchair, divan, tramcar, carriage etc. In a final group he aces: a shirt, trousers, a cup, a bed, clothes etc.

When checking he makes some things more exact, separating wers and berries.

Here he hesitates a little about where to place the currant (which cording to its colour belongs in the group of flowers) but then places with the berries.

When the experimenter asks why he placed it in this way, answers ecause it isn't a flower.'

osha (*B*)

oes not understand the instructions for a long time. The experi-enter's example is not perceived; when he puts together a group of wers, Liosha perceives this purely externally and begins to put gether any kind of picture saying (in imitation of the experimenter): he knife is like the table, the tramcar is like the carrot,' etc.

Soon colour is singled out as a feature which links pictures different meaning. An attempt to transfer to meaning as a principle of selec-n fails. The subject soon slips from selection to collection of dif-rent objects.

After four days another experiment takes place. When initial instruc-ns have been given, the subject at once begins to put aside pictures presenting a red shirt, red teapot, red tramcar; then, in another oup, pictures representing blue socks, a blue flower, several black jects (a bicycle, divan, chair, horse, cat).

When the basis of the classification is checked, it points to colour. The perimenter explains that it is necessary to produce a classification on e basis of meaning. The subject sets aside pictures representing a ttle and a tramcar: 'The kettle is iron and the tramcar.'

However, when asked to what group the hen (which is red) belongs, nether with the white goose or with the raspberry, places it with the spberry.

In all the subsequent control experiments once more slips into ternal comparison of objects according to colour.

ere significant differences in the process of classification are early demonstrated. In the case of Twin A, the process of lective generalization has a developed, objective character and anscends the limits of direct perception of the objects (their rm and colour). But in Twin B this process is determined to a table degree by the external similarity of the objects, and

attempts to introduce generalization depassing the limits of th visual field of perception did not meet with success.

These peculiarities arose still more clearly in the course of similar experiment with a number of toys.

The twins are given several toys (enumerated in the earlier exper ment described above).

Yura (A)

At first places the toys separately, looks at them, puts together identic things. Then places a sailor with a boat. Places next to a lorry a han mer and brush: 'They will mend, they'll paint.' Afterwards places little pig: 'I saw a cow carried in a car, like this.'

To the engine adds the key – 'they will lock the engine door' – an two nails – 'to make the engine strong.'

Holds a reel of cotton in his hand for a long time, then stands it b the sailor: 'They will sew on buttons that come off.'

To the lorry adds the pencil: 'It will write the number, which here . . .' Puts with the bear, the hare and two mushrooms: 'The mush rooms are growing in the forest there, the bear sits there and the ha jumps about in the forest.'

There result these groups: 1. Horse, cow, cart, goat, pig, dog, tre 2. Bear, hare and two mushrooms. 3. Plate and, surrounding it, the he chicken, goose. 4. Lorry, two sailors, the shepherd, the button etc.

Liosha (B)

First takes the train, places a car next to it, then, around these a car harnesses to this a horse, and adds a goat, chicken, pig and rabbit.

The experimenter repeats the instructions: to divide into appropria groups. Liosha places 1. the train, car, boat; then separately 2. tw dogs; astride one of them a bear; 3. the horse with the cart and a cov 4. the aeroplane, in which is the figure of a man and the goose; 5. pick up a soup bowl, stands a cup on it and picking out all the crocker says: 'The kitchen.' 6. In half of a dividing ball he puts the reel cotton, paintbrush, pencil, exercise book, key: 'This is a grou (class). Then relates where the class is held. The experimenter points the second group: 'And what is this?' – 'A street.' 'And this?' 4. – street.' 'Does the goose go with the aeroplane?' – 'It does.' 'And this 1. – 'An engine.' 'Here are a boat and a car, what is it all?' – 'Anoth street.'

Names other groups he has made in the same way.

The differences already noted are exhibited here particular

early. As a rule, when the trained Twin A groups objects he cludes them each time in a situation formed with the aid of eech; each object is allocated to the corresponding group he so rmulates, and the whole classification takes on the precise, finite character of an operation in 'an imaginative plan'.

Altogether different peculiarities distinguish the process of assification in the case of Twin B. Here the grouping of objects ntinues to arise only in the process of direct manipulation of ese objects, and bears, therefore, a more direct character. erbal formulation does not arise in the actual process of mani- ulation but only after this, when the objects have been mani- ulated, and is, therefore, not so much the foundation as the sult of the given manipulation.

In this case, the very grouping of objects itself is accomplished iefly on the basis of incidental indications; this shows that a rbally formulated project does not determine the whole struc- re of the intellectual process and the latter is, in an important easure, subordinated to direct relations to objects and to the production of the visual situation with which they are con- cted.

Specific differences between the twins, appearing as a result of e special speech training of one of them, were also clearly monstrated in an investigation of elementary operations of scursive thinking.

When, after ten months of the experiment, the twins were ked to find the difference between two objects, they resolved s problem in a different way. Twin A detected a difference tween objects, for instance (when comparing the conception of stone' with the conception of 'an egg'): 'A stone is black, an g is white'. But Twin B usually did not depass the limits of nple description of a single common feature of the situation g. 'a white stone and a white egg') and therefore did not even gin the necessary operation of comparison.

Differences between the twins showed up even more distinctly nen it was a question of operations of deduction from verbal emises.

This operation was accessible to the trained Twin A but proved

difficult for Twin B. Twin A generalized a single response an drew from it a logical deduction. But Twin B retained th individual response within the limits of the specific facts state it did not, therefore, become the prerequisite for a correspondin deduction and was not transformed into reasoning.

We may give a specific example of this.

Both children are presented with pictures comprising a series of absu dities. Here is how reasoning proceeded in the case of either twin.

Yura (*A*)

'Do you think this happens?' – 'It does.' 'What is the cat doing?' 'The cat is playing.' 'Can a cat really play on the violin?' – 'No.' 'The does this happen?' – 'No.'

Liosha (*B*)

'Is this drawing right?' – 'It is.' 'Can a cat really dance like this?' 'No.' 'Then is this drawing right or not?' – 'Right.' 'Have you seen cat play on a balalaika?' – 'No.' 'Then is the drawing right or not? 'Right.' 'But can a cat play a balalaika?' etc.

This indicates clearly how great were the differences revealed the flow of intellectual processes in our twins.

Finally we may examine data indicating essential differences discursive activity between the twins, arising as a result of th fact that one of them gradually passed through a course speech training.

We have already pointed out elsewhere[25] that at the ear stages of development the child cannot yet perceive a word itself; that only in the process of play, and further of teaching school, does the word itself become an object of special perce tion and special conscious activity.

It is precisely in this respect that differences between the twi were manifested, one having been specially trained in spee while, in the other, speech arose only as a result of practic activity.

When, therefore, after ten months of the experiment, bo twins were set problems involving a series of operations with th aid of their own speech, it was demonstrated that an elementa special operation with the aid of speech was accessible to th

ained Twin A but remained inaccessible to Twin B who had not ndergone special speech training.

Several examples may be given to illustrate this position. he children are given a series of words (at first singly, then in a ntence) and are asked to reckon up these words.

Twin A easily reckons up the words in a sentence and then sily extracts them in order, indicating the second and third ords. Twin B cannot extract a separate word, he extracts not a ord but only an object or a situation without understanding the ords, and cannot master the operation further than this even hen we give him the necessary help.

vin A

Mama: went: to the shop.* How many words?' – 'Three.' 'The first?' 'Mama.' 'The second?' – 'went.' 'The third?' – 'the shop.'

he girl: ate: the cake. How many words here?' – 'Three.' 'The st?' – 'The girl ate the cake.' 'No, the first?' – 'The girl.' 'The cond?' – 'ate.' 'The third?' – 'the cake.'

vin B

he boy: hit: the dog. How many words?' – 'Two.' 'The first?' – he boy.' 'The second?' – 'the dog.'

he dog: bit: the boy. How many words?' – 'Two.' 'The first?' – he boy.' 'The second?' – 'The dog.' 'Are there really two? No more?' Vhen counting again the subject once more gives two elements.)

fter this, though Liosha could correctly extract words from ntences consisting of two elements, he could not do so in rela- on to sentences with three words.

he boy: was eating: a sweet. How many words?' – 'Two.' 'The st?' – 'The boy.' 'The second?' – 'a sweet.') Further experiments did t result in a correct solution to the problem.)

hen both twins were given sentences including indications of a uantity of objects which differed from the number of words in e sentence, Twin A easily abstracted the quantity from the

*The colons indicate the three Russian words (e.g. 'Mama: poshla: v agazin'). In later examples a literal translation is given to maintain the me order of words. (Ed.)

situation and added up the number of words included in th sentence; but Twin B could not master this abstraction and pe sisted in adding up the objects mentioned in the sentence.

Twin A

'In the room: (are) five: chairs. How many words here?' – 'Three 'The first?' – 'In the room.' 'The second?' – 'five.' 'The third?' 'chairs.'

Twin B

'In the room: (is) one: chair. How many words here?' – 'One.' 'And – In the dining room: one: girl?' – 'Two.' 'The first?' – 'girl 'The second?' – 'the dining room.'

'And – In the dining room: five: girls?' – 'Six.' 'The first?' – 'Th dining room.' 'The second?' – 'girls.' 'The third?' – 'Don't know.'

Later the children were given sentences and asked to say whethe a particular word had been in them, the word in the questio sometimes only being analagous in sense to the original wor in the sentence. Twin A could easily identify word from word mastering the operation of analogy, but Twin B did not succee in solving this problem.

Twin A

Easily distinguishes a word formerly in a sentence from its synonym ('Na ulitze idiot sneg') 'In the street: comes: snow. Have I said her the word "snow"?' – 'You have.' 'And "falls" (padaet)?' – 'No 'And – "comes" (idiot)?' – 'Yes' etc.

('Malchik koupalsia v vannie') 'The boy: was bathing himself: in th tub. Was the word "boy" here?' – 'Yes.' 'Trough (Koryto)?' 'No.' 'Was washing himself (mylsia)?' – 'No.' 'Was bathing himsel (koupalsia)?' – 'Yes.'

Twin B

There is a tendency to detach the word from the sense and to confus verb synonyms.

('Malchik koupalsia v vannie') 'The boy: was bathing himself: in th tub. Did I say here the word "boy"?' – 'Yes.' 'Trough (Koryto)?' 'No.' 'Was washing himself (mylsia)?' – 'You did.' 'Was bathing him self (koupalsia)?' – (a pause) 'You did.'

('Dedushka podaril igrushku') 'Grandfather: gave away: a toy. Th word "gave away"?' – 'You said it.' 'Old man (Starichok)?' – 'No 'Gave (dal)?' – 'You said it.' 'Ball (Miachik)?' – 'No.'

ur observations brought to light essential differences between ie twins as regards capacity to assess the grammatical correct-ess of a sentence. Both twins were given sentences with a rammatically incorrect structure, then asked to assess their rrectness and say how the sentence should be corrected. Twin easily detected the error and in the given conditions was able to rrect the sentence. This problem remained entirely inaccessible Twin B, who was still so deficient in grammar that he could not nse the defect in a sentence and so was unable to correct it.

win A

etects an error in a sentence but cannot at first correct it; later easily asters the problem.

Ia kushal konfetk*ami*') 'I was eating: with sweets. Did I say that cor-ctly?' The subject repeats the sentence without alteration. Is con-ised.

Ia risuiu tetradk*ami*') 'I am drawing: *with* an exercise book. Is that ght?' – 'No.' 'How must it be said?' – 'I am drawing *in* an exercise ook' ('Ia risuiu *na* tetradke').

Ia liubliu igrushkami?') 'I like: with toys?' – 'Wrong.' 'What is ght?' – 'I like to play with toys' ('Ia liubliu igrat igrushkami').

win B

annot understand mistakes in the construction of a sentence even ter they have been explained. In each case assesses an ungrammatical ntence as correct.

Ia kushal konfetkami') 'I was eating with sweets. Did I say that ght?' – 'Right' etc.

he facts given above allow us to point to precise differences etween the twins, arising after their separation and accompany-g the special training of one of them.

After ten months of the experiment both twins developed full-alue practical speech activity as a result of which there was a per-ptible reorganization of their intellectual processes. But only ne of them, Twin A who had undergone continuous systematic xercises in speech, developed a '*theoretical attitude*' *towards peech* proper to his age. In the case of this twin, speech became n object of special perceptual activity, its structure was per-ived, and precisely because of this elementary discursive opera-

tions became accessible to him while remaining inaccessible t
the other twin.

The appearance of these discursive operations must be attr
buted to the special training which was undertaken with one
the twins.

Chapter 8
Conclusions

This concludes the survey of the course of our experiment and we may now summarize some of the more essential conclusions.

It is well known to scientific or materialist psychology that speech, which reflects objective reality, directly influences the formation of complex human activity; that the second signal system introduces 'a new principle of nervous activity – the abstraction and with this the generalization' of the preceding signals and thereby raises mental processes to a new level.

As yet, however, insufficient material has been provided to establish, with the necessary precision and on a firm foundation of evidence, the extent to which language exercises this formative influence on mental processes, about which we all know, and with what specific results. The present experiment was designed to throw light on this problem.

We were able to find appropriate subjects, a pair of identical twins of five years of age who suffered from a peculiar defect which created conditions for a retardation of speech development; added to this was the 'twin situation' which did not create an objective necessity for developing language and so constituted a factor which fixed this retardation.

During the preliminary period of our observations, the twins did not experience the necessity of using language to communicate with each other; a self-sufficient pair, they at most experienced the necessity 'to point to something in the process of practical activity', and it was as a result of this situation that they developed elementary 'synpraxic' speech interlocked with action.

This primitive speech did not normally depass the limits of naming objects in the process of direct intercourse and most frequently of all took the form of exclamations which only acquired significance in dependence upon the action of which they formed part.

To this primitive speech, interlocked with action, there

corresponded a peculiar, insufficiently differentiated, structure of consciousness; as has been shown, the twins were unable to detach the word from action, to master orienting, planning activity, to formulate the aims of activity with the aid of speech and so to subordinate their further activity to this verbal formulation. Therefore, even at the age of five to five and a half years our twins could not master skills nor organize complex play of a kind proper to children of this age, and were unable to engage in productive, meaningful activity. Their intellectual operations thus remained very limited; even such operations as elementary classification were beyond them.

In order to discover the factors that played a leading role in the development of speech and the changes that might be brought about in the construction of the twins' mental life as a result of the rapid acquisition of language, we undertook a special experiment.

It was necessary, to ensure a rapid development of speech, to create an objective necessity for using language in the company of speaking children. We therefore removed the 'twin situation' by separating the children and placing them in separate, parallel groups in a kindergarten and then observed the changes that took place in their speech. Subsequently we conducted a special systematic experiment in teaching speech with one of the twins, with the aim of developing perception of speech, the habit of making use of developed sentences etc.

Our experiment produced very rapid results.

As a result of removal of the 'twin situation' primitive speech, interlocked with practical activity, very quickly fell into the background and in the new situation the children were soon in a position to pass on to communicating with the aid of a normal language system.

Three months after the experiment began we could already observe substantial improvements in the twins' speech. Leaving aside small phonetic defects, the lexicology and grammar of their speech approximated to the normal speech of their counterparts. Their speech also fulfilled new functions which had formerly been absent; in place of speech interlocked with direct activity, or

expressive speech, there developed narrative and then planning speech.

Even more significant was the fact that the whole structure of the mental life of both twins was simultaneously and sharply changed. Once they acquired an objective language system, the children were able to formulate the aims of their activity verbally and after only three months we observed the beginnings of meaningful play; there arose the possibility of productive, constructive activity in the light of formulated aims, and to an important degree there were separated out a series of intellectual operations which shortly before this were only in an embryonic state.

In the course of further observations we were able to note cardinal improvements in the structure of the twins' mental life which we could only attribute to the influence of the one changed factor – the acquisition of a language system. Differences between the children also arose connected with the systematic training of Twin A in customary speech; he was thereby enabled to make speech an object of perception and to develop grammatically developed forms of speech communication. Our records showed that this was reflected in specific speech operations and discursive thinking in the case of this twin, in which he perceptibly surpassed the other.

Therefore the results of our experiment show that, with the creation of an objective necessity for speech communication, the children were satisfactorily prepared for the acquisition of a language system; not only did they develop new forms of communication with the aid of developing verbal speech, but also there were called forth significant changes in the structure of their conscious activity, built up on the basis of verbal speech.

There is no doubt that these facts provide new material for an understanding of the changes brought about by speech in the formation of the more complex mental processes in man.

Notes

1. A basic conception of the child's mental development has been set out in detail by L. S. Vigotsky, *The Intellectual Development of Children in the Process of Education* (Moscow, 1935).
2. This proposition has been developed in the work of A. N. Leontiev, see 'The nature and formation of mental properties and processes in man', *Questions of Psychology*, no. 1, 1955. Translated in *Psychology in the Soviet Union*, ed. Brian Simon (1956, p. 226 ff.).
3. I. P. Pavlov, *Collected Works*, vol. 3 (Moscow, 1949; see *Selected Works*, Moscow, 1955, p. 537); an English translation published by the Foreign Languages Publishing House.
4. L. S. Vigotsky, *Thinking and Speech* (Moscow, 1934).
5. A. N. Leontiev, *The Development of Memory* (Moscow, 1930).
6. G. L. Rosengardt-Pupko, *Speech and the Development of the Child's Perception* (Moscow, 1947). F. I. Fradkina, 'The rise of the child's speech', *Scientific Notes of the Leningrad Educational Institute*, vol. 7, 1955; T. E. Konnikova, 'The first stage in the development of the child's speech', *Thesis*, A. I. Herzen's Educational Institute, Leningrad (1947); E. K. Kaverina, *The Development of Children's Speech during the First Two Years of Life* (Moscow, 1950); M. M. Koltsova, 'The rise and development of the second signal system in the child', *Researches of the Laboratories of I. P. Pavlov*, vol. 4, 1949; 'Studies in the formation of the signal systems in the child', *Thesis*, Institute of Physiology, Academy of Sciences of the USSR, Leningrad (1953).
7. The work of A. N. Leontiev and A. V. Zaporozhets and the closely connected work of D. B. Elkonin, N. G. Morozov, L. S. Slavina and others. See *Questions of Child Psychology*, ed. A. N. Leontiev, *Proceedings of the Academy of Educational Sciences of the RSFSR* vol. 14, 1948.
8. A. G. Ivanov-Smolensky, 'Concerning the study of the joint activity of the first and second signal systems', *Journal of Higher Nervous Activity*, vol. 1, no. 1, 1951; 'The interaction of the first and second signal systems in certain normal and pathological conditions', *Physiological Journal of the USSR* vol. 35, no. 5, 1949. N. I. Krasnogorsky, *Studies of Higher Nervous Activity in Animals and in Man*, vol. I (Moscow, 1954).
9. M. S. Bychkov, L. A. Shvarts and others.

10. 'The role of the word in the development of the child's cognitive ıctivity', *Speeches at the Conference on Psychological Questions, July 1953* (Moscow, 1954). Translated in *Psychology in the Soviet Union*, p. 97 ff. In her later work Lublinskaya has disclosed changes introduced by the word into the process of forming images, 'Certain peculiarities n the interaction of speech and image in the pre-school child', *Questions of Psychology*, no. 1, 1956.

11. L. I. Kotliarevsky and V. K. Fadeeva have shown that this takes place in children.

12. E. N. Martsinovskaya, 'An investigation of the reflectory and egulating role of the second signal system in children of pre-school ıge', *Proceedings of the Department of Psychology, Moscow University*; A. A. Abramian, 'Organization of the child's voluntary activity with he aid of verbal instruction', *Thesis*, Moscow University (1955).

13. L. S. Vigotsky and A. R. Luria, 'The function and fate of egoentric speech', *Proceedings of the Ninth International Psychological Congress* (New Haven, 1929).

14. N. P. Paramonova, 'Development of the interaction of the two ignal systems in the formation of motor reactions in children of preschool age', *Thesis*, Moscow University (1953).

15. And the closely related research of G. A. Kisliuk.

16. A. I. Meshcheriakov, 'Disturbance of the interaction of the two ignal systems in the formation of simple motor reactions in cases of ocal paralysis of the brain', *Thesis*, Moscow University (1953). M. P. vanova, 'Disturbance of the interaction of the two signal systems in he formation of complex motor reactions in cases of paralysis of the rain', *Thesis*, Moscow University (1953). V. I. Lubovsky, 'Some eculiarities of the joint work of the two signal systems in the formation f motor reactions in oligophrenic children', *Thesis*, Moscow University (1955). E. N. Martinovskaya, 'Disturbance of the generalizing unction of speech in the formation of temporary connections in mentally retarded children', *Thesis*, Moscow University (1953).

17. Some light is thrown on these questions in a paper by A. R. Luria, The role of language in the formation of temporary connections in nan', *Questions of Psychology*, no. 1, 1955. Translated in *Psychology n the Soviet Union*, p. 115 ff.

18. A. Gelb and K. Goldstein, *A Psychological Analysis of Neuroathological Cases* (Leipzig, 1920); K. Goldstein, *The Construction of he Organism* (The Hague, 1934); A. Gelb, Medical psychology, *Acta sychologica*, 1937; H. Head, *Aphasia and Kindred Diseases of Speech*, ols. 1 and 2 (Oxford, 1926).

19. R. M. Boskis, *The Development of Verbal Speech in the Deaf-Mute Child* (Moscow, 1939); N. G. Morozova, *The Teaching of Conscious Reading to Deaf-Mute Schoolchildren* (Moscow, 1953); B. D. Korsunskaya and N. G. Morozova, *Producing Concepts in the First Classes of Deaf-Mute Schools* (Moscow, 1939).
20. See A. N. Sokolov, 'Speech mechanisms of intellectual activity', *Proceedings of the Academy of Educational Sciences of the RSFSR*, vol. 81, 1956; N. I. Zhinkin, *The Mechanisms of Speech* (Moscow, 1958), L. K. Nazarova, 'The role of speech kinesthesis in writing', *Soviet Education*, no. 6, 1952.
21. An exceptional case, studied by A. R. Luria, was a patient with weakened speech kinesthesis whose speech processes flowed only in the form of external speech so that the simple pressing down of the tongue led to almost complete exclusion of speech from the flow of complex mental processes.
22. N. P. Paramonova (1953); A. A. Lublinskaya (1953; 1956).
23. These tests are discussed in A. R. Luria, *Traumatic Aphasia* (Moscow, 1947).
24. Following the method worked out by A. N. Mirenova; see A. R. Luria, 'The development of constructive activity in the pre-school child', in *Psychology of the Pre-School Child*, ed. A. N. Leontiev and A. V. Zaporozhets (Moscow, 1948).
25. A. R. Luria, 'Defects in grammatical operations in cases of brain disease', *Proceedings of the Academy of Educational Sciences of the RSFSR*, vol. 3 (1946). The subject has recently been dealt with by S. N. Karpova, 'Perception of the verbal structure of speech', *Questions of Psychology*, no. 4, 1955.

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